

SAMSUNG

SAMSUNG Anycall
SPH-A880

SERVICE *Manual*

SAMSUNG Anycall

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ELECTRONICS

Samsung Electronics Co.,Ltd. May. 2005
Printed in Korea.

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Code No.: GH68-07420A
BASIC.

1. General Introduction

SPH-A880 DBTM(Dual Band Tri Mode) phone functions as analog phone working in AMPS(Advanced Mobile Phone Service) mode and digital phone working in PCS(Personal Communication Service), CDMA(Code Division Multiple Access) and GPS modes.

The following standards and minimum performance standards shall be met or exceeded by each subscriber unit.

Air Interface

TIA/EIA IS-2000 Rel. 0 : Mobile Station-Base Station Compatibility Standard for Dual Mode Spread Spectrum Systems.

TIA/EIA IS-2000 Rel. 0, Addendum 1 : First Addendum to Mobile Station-Base Station Compatibility Standard for Dual Mode Spread Spectrum Systems.

TIA/EIA IS-2000 Rel. 0, Addendum 2 : Second Addendum to Mobile Station-Base Station Compatibility Standard for Dual Mode Spread Spectrum Systems.

TIA/EIA IS-98-D : Recommended Minimum Performance Standards for Dual-Mode Spread Spectrum Mobile Stations.

TIA/EIA/IS-127 : Enhanced Variable Rate Codec, Speech Service Option 3 for Wideband Spread PCS Digital Systems.

TIA/EIA/IS-127-2 : Enhanced Variable Rate Codec, Speech Service Option 3 for Wideband Spread Spectrum Digital Systems - Addendum 2.

TIA/EIA/IS-733-1 : High Rate Speech Service Option 17 for Wideband Spread Spectrum Communication Systems - Addendum 1 (TTY/TDD Extension).

CDMA Receiver/Transmitter Specifications and Requirements

The Subscriber Unit shall comply with ANSI J-STD-008 and meet or exceed TIA/EIA IS-98D.

The Subscriber Unit shall comply with Personal Station Class II.

Analog Receiver/Transmitter Specifications and Requirements

The Subscriber Unit shall comply with TIA/EIA IS-95B and meet or exceed TIA/EIA IS-95.

The Subscriber Unit shall comply with Mobile Station Power Class III.

2. Specification

2-1. General

ITEM	US PCS	CDMA	AMPS	GPS
Tx Freq. range	1850 ~ 1910MHz	824.04 ~ 848.97MHz	824.04 ~ 848.97MHz	-
Rx Freq. range	1930 ~ 1990MHz	869.04 ~ 893.97MHz	869.04 ~ 893.97MHz	1575.42MHz
Channel Bandwidth	1.23MHz	1.23MHz	30KHz	2MHz
Channel Spacing	50KHz	30KHz	30KHz	Not Used
Number of Channel	1200	832	832	1
Duplex Separation	80MHz	45MHz	45MHz	-
Type of Emission	1M25F9W	1M25F9W	40K0F8W,40K0F1D	-
In/Output Impedance	50	50	50	50
Tx Local Frequency	$F_{Tx} * 0.7999$	$F_{Tx} * 1.6666$	$F_{Tx} * 1.6666$	-
Rx Local Frequency	$F_{Rx} * 0.8888$	$F_{Rx} * 2$	$F_{Rx} * 2$	$F_{Rx} * 2$
TCXO Frequency	19.2MHz	19.2MHz	19.2MHz	19.2MHz
Freq. Stability	$(F_{Rx} - 80\text{MHz}) \pm 150\text{Hz}$	$(F_{Rx} - 45\text{MHz}) \pm 300\text{Hz}$	$\pm 2.5\text{ppm}$	-
Operating Temperature	-30 ~ +60	-30 ~ +60	-30 ~ +60	-30 ~ +60
Supply Voltage	3.8 ~ 4.2V			
Size and Weight	STD : 40.6 * 63.4 * 3.85 mm, 25.2g, 900 mA/H EXT : 40.9 * 65.7 * 9.24 mm, 37.7g, 1100 mA/H			

2-1-1. PCS CDMA(1900MHz)

A. Transmitter

Waveform Quality : 0.944 or more

Open Loop Power Control Range

. -25dBm : -60.5dBm -41.5dBm

. -65dBm : -20.5dBm +1.5dBm

. -104dBm : +15.0dBm +30dBm

Minimum Tx Power Control : below -50dBm

Closed Loop Power Control Range : ± 24 dB

Maximum RF Output Power : 25dBm

Occupied Bandwidth : 1.23MHz

Conducted Spurious Emission @1.25 MHz: -42dBc/30kHz

B. Receiver

Rx Sensitivity and Dynamic Range :-104dBm, FER=0.5% or less

-25dBm, FER=0.5% or less

Conducted Spurious Emission

. 1930 1990MHz : < -81dBm

. 1850 1910MHz : < -61dBm

. All Other Frequencies : < -47dBm

Single Tone Desensitization : lower than 1 %

Rx Power = -101dBm

Tone Power = -30dBm

Tone Offset from Carrier = ± 1.25 MHz

Intermodulation Spurious Response Attenuation : lower than 1 %

Rx Power = -101dBm

Tone Power 1 = -43dBm

Tone Power 2 = -43dBm

Tone 1 Offset from Carrier = ± 1.25 MHz

Tone 2 Offset from Carrier = ± 2.05 MHz

2-1-2. CDMA(800MHz)

A. Transmitter

Waveform Quality : 0.944 or more

Open Loop Power Control Range

. -25dBm : -57.5dBm -38.5dBm

. -65dBm : -17.5dBm +1.5dBm

. -104dBm : +18.0dBm +30dBm

Minimum Tx Power Control : below -50dBm

Closed Loop Power Control Range : ± 24 dB

Maximum RF Output Power : 25dBm

Occupied Bandwidth : 1.23MHz

Conducted Spurious Emission @ 0.9 MHz: -42dBc/30kHz

@ 1.25 MHz: -54dBc/30kHz

B. Receiver

Rx Sensitivity and Dynamic Range :-104dBm, FER=0.5% or less

-25dBm, FER=0.5% or less

Conducted Spurious Emission

. 1930 1990MHz : < -81dBm

. 1850 1910MHz : < -61dBm

. All Other Frequencies : < -47dBm

Single Tone Desensitization : lower than 1 %

Rx Power = -101dBm

Tone Power = -30dBm

Tone Offset from Carrier = ± 0.9 MHz

Intermodulation Spurious Response Attenuation : lower than 1 %

Rx Power = -101dBm

Tone Power 1 = -43dBm

Tone Power 2 = -43dBm

Tone 1 Offset from Carrier = ± 0.9 MHz

Tone 2 Offset from Carrier = ± 1.7 MHz

2-1-3. AMPS

A. Transmitter

RF Output Power : 26 dBm

Carrier ON/OFF Conditions

"ON" Condition : within ± 3 dB of specification output(in 2 ms)

"OFF" Condition : below -60dBm(in 2ms)

Compressor

Compression Rate : 2 : 1

Attack Time : 3 ms

Recovery Time : 13.5 ms

Reference Input : input power level for producing a nominal ± 2.9 kHz

: peak frequency deviation of transmitted carrier

Preamphasis : 6dB/OCT within 0.3 3 kHz

Maximum Frequency Deviation

Modulation Deviation Limiting : ± 12 kHz

Supervisory Audio Tone : ± 2 kHz($\pm 10\%$)

Signaling Tone : ± 8 kHz($\pm 10\%$)

Wideband Data : ± 8 kHz($\pm 10\%$)

Post Deviation Limiter Filter

3.0 5.9 kHz : above 40 LOG(F/3000)dB

5.9 6.1 kHz : above 35dB

6.1 15 kHz : above 40 LOG(F/3000)dB

Over 15 kHz : above 28 dB

Spectrum Noise Suppression

- For all modulation

fo +20 kHz fo + 45 kHz : above 26dB

- For modulation by voice and SAT

fo + 45 kHz : above 63dB+10LOG(PY)dB

- For modulation by WBD(without SAT) and ST(with SAT)

fo +45 kHz fo + 60 kHz : above 45 dB

fo +60 kHz fo + 90 kHz : above 65 dB

fo +90 kHz 2 fo : above 63 dB + 10 LOG(PY) dB

(where fo = carrier frequency, PY=mean output power in watts)

Harmonic and conducted Spurious Emissions : below 43 + 10 LOG(PY) dB

B. Receiver

De-emphasis : -6dB/OCT within 0.3 3 kHz

Expander

Expander Rate : 1 : 2

Attack time : within 3 ms

Recovery Time : within 13.5 ms

Reference input : output power level to a 1000Hz tone from a carrier within ± 2.9 kHz
peak frequency deviation

Sensitivity : 12 dB SINAD/-116dBm

Intermodulation Spurious Response Attenuation : above 65dB

RSSI Range : above 60dB

Protection Against Spurious Response Interference : above 60dB

In Band Conducted Spurious Emission

Transmit Band : below -60 dBm

Receive Band : below -80 dBm

Out of Band Conducted Spurious Emissions : below -47dBm

Radiated Spurious Emission

Frequency Range		: Maximum Allowable EIRP
25	70MHz	: -45dBm
70	130MHz	: -41dBm
130	174 MHz	: -41 -32dBm
174	260 MHz	: -32 dBm
260	470 MHz	: -32 -26 dBm
470	1G MHz	: -21 dBm

2-1-4. GPS

- Location Accuracy

For 67% of calls	: less than 50 meter
For 95% of calls	: less than 150 meter

3. Installation

3-1. Installing and Removing the Battery

To install

1. Insert the battery into the opening on the back of the phone.
2. Make sure the plastic tabs on the back are inserted into the matching slots in the phone.
3. Press down until the latches snap into place.

To remove

1. Make sure the power is off.
2. Push the battery release latch up completely.
3. Pull and lift the battery away from the phone.

3-2 For Desk Top Use

1. Choose a proper location to install the charger for desk top use.
2. Plug the power cord of the charger into an appropriate wall socket. When the power is connected correctly, the lamps turn on briefly.
3. To charge the battery pack, insert the pack into the slot of the charger. The lamp on the front panel of the charger lights up red.

Specifications using Battery Charger

Battery Type	Standard Battery (Li-ion, 900mAh)
Charging Time	2 hours
SEC-Code	GH43-01821A

4. NAM Programming

NAM program can be changed as following table:

Notes:

- In the NAM program mode, each item show you the currently stored data. you can modify the data by entering a new data.
- You can move to next window by pressing "**OK**" key.
- When you press a wrong number, press "**BACK**" key to delete the last number or press and hold "**BACK**" key to delete all number
- You can move to menu screen by pressing "MENU" key.
- You can change some selection option keys by pressing "Left" or "Right" navigation.

4-1. Single NAM

4-1-1. General Setup

LCD Display	Key in	Funtion
	#, #	Enter the NAM Mode
Enter ??????.#	222222, #	Enter random 6-digit code (MSL) and # 222222 is a default value.
SVC Menu 1: View 2: Edit 3: Done	1	View Phone Number and MSID
Phone Number 1234567890	Right key or Down key	Phone number is displayed
MSID 1234567890	MENU or BACK	Mobile ID is displayed
SVC Menu 1: View 2: Edit 3: Done	2	Choose 'Edit' to change Phone Number and MSID
Phone Number 1234567890	OK	- Phone number setup - To change phone number, enter phone # - Store it
MSID 1234567890	OK	- Mobile ID setup - To change phone number, enter phone # - Store it
SVC Menu 1: View 2: Edit 3: Done	3	Choose 'Done' to exit the NAM mode

4-1-2. NAM Mode Display

LCD Display	Key in	Funtion
	#,3,2,8,2,#	Enter the Data Program screen
3G Data Prog 1. User Name 2: Browser 3: IOTA Prog. 4: Camera URL 5: Advanced 6: Multimedia	5	Display the 3G Data program.
Enter Service Code ??????	222222	Enter random 6-digit code (MSL) - 222222 is a default value
Advanced 1: View 2: Edit	1	Choose "VIEW" to dispaly the Advanced NAM Information
ESN B0000000	Right key or Down key	Electronic Serial Number of the phone is displayed
CERT	Right key or Down key	Java security - Dormant Certificate Wakeup(On), and Sleep(off) status is displayed
P_REV 6	Right key or Down key	Common Air Interface version is displayed
VOCODER SVCOPT EVRC	Right key or Down key	13K or EVRC
SCM 01101010	Right key or Down key	Station Class Mark displays the power class, transmission, slotted class, dual mode.
Lock Code 0016	Right key or Down key	Lock code, current status is displayed
Slot Mode YES	Right key or Down key	Slot mode. 'Yes' indicates the slot mode.
Slot Index 2	Right key or Down key	Slot mode index. The high number means longer sleeping time
HOME SID 4139	Right key or Down key	SID written in the list,current status is displayed.
HOME NID 65535	Right key or Down key	NID written in the list,current status is displayed.
MCC 310	Right key or Down key	Imsl Mobile Country Code, current code is displayed.
MNC 00	Right key or Down key	Imsl Mobile Network Code, current code is displayed.
ACCOLC 6	Right key or Down key	CDMA Access Overload Class, current status is displayed

NAM CDMA Home Sys Reg Yes	Right key or Down key	CDMA Home system ID, current status is displayed
NAM CDMA FSID Reg Yes	Right key or Down key	CDMA foreign SID, current status is displayed.
NAM CDMA FNID Reg Yes	MENU or BACK	CDMA foreign NID,current status is displayed.

4-1-3. NAM Mode Setup

LCD Display	Key in	Funt ion
	#, #, 3, 2, 8, 2, #	Enter the Data Program screen ('##DATA')
3G Data Prog 1. User Name 2: Browser 3: IOTA Prog. 4: Camera URL 5: Advanced 6: Multimedia	5	Display the 3G dara program.
Enter Service Code ??????	222222	Enter random 6-digit code (MSL) - 222222 is a default value
Advanced 1: View 2: Edit	2	Choose "EDIT" to change the Advanced NAM information
ESN B0000000	Right key or Down key	Electronic Serial Number of the phone is displayed
CERT	Right key or Down key	Java security - Dormant Certificate Wakeup(On), and Sleep(off)
P_REV 6	Right key or Down key	Common Air Interface version is displayed
VOCODER SVC OPT EVRC	Right key or Down key	Origination Service Option is displayed - Change Service Option - Store it
SCM 01101010	Right key or Down key	Station Class Mark displays the power class, transmission, slotted class, dual mode.
Lock Code 0016	4-digit Code OK	Lock code, current status is displayed - To change Lock Code, enter a new code - Store it
Slot Mode YES	Left or Right key OK	Slot mode. 'Yes' indicates the slot mode. - Change status - Store it

Slot Index 2	0 ~ 7 OK	Slot mode index. The high number means longer sleeping time - To change Slot Index, enter new one - Store it
HOME SID 4139	number OK	SID written in the list,current status is displayed. - Enter new one to change code - Store it
HOME NID 65535	number OK	NID written in the list,current status is displayed. - Enter new one to change code - Store it
MCC 310	number OK	Imsl Mobile Country Code, current code is displayed. - Enter new one to change code - Store it
MNC 00	number OK	Imsl Mobile Network Code, current code is displayed. - Enter new one to change code - Store it
ACCOLC 6	class number OK	CDMA Access Overload Class, current status is displayed - Enter new one to change code - Store it
NAM CDMA Home Sys Reg Yes	Left or Right key OK	CDMA Home system ID, current status is displayed - Change status - Store it
NAM CDMA FSID Reg Yes	Left or Right key OK	CDMA foreign SID, current status is displayed. - Change status - Store it
NAM CDMA FNID Reg Yes	Left or Right key OK	CDMA foreign NID,current status is displayed. - Change status - Store it

5. Circuit Description

5-1. Logic Part

5-1-1. Power Supply

Press "**END/** " key to turn on the phone and then the **S3.6** and **ON_SW** signals will be connected. This turn on inner regulator(V_MSMC, V_PA, VPD) of U200(MAX1526) and release them from the shut down state to output regulated 1.83V(V_MSMC), 2.6V(V_MSMA) and 2.6V(VPD).

The **S3.6** applied to ON_SW will activate U200(MAX1526). This will allow MSM(U101) to send out PS_HOLD(logic HIGH) to continue turning on inner regulator(V_MSMC, V_PA, VPD) even after the **END/** key is released.

The other regulators will be controlled ON/OFF state by I²C-compatible 2 wire serial interface.

The regulated voltage VPD is used in the digital part of MSM and Memory(U102) Part.

The regulated voltage VPA is used in the analog part of MSM.

The regulated voltage V_MSMC is used in the core part of MSM/Memory.

The regulated voltage V_RFTX is used in the TX RF part of S1M8690X.

The regulated voltage V_RFRX is used in the Rx RF part.

The regulated voltage V_TCXO is used in the VCO part and TCXO part.

The regulated voltage V_SYNTH is used in the RFT circuit of PLL part.

5-1-2. Logic

The logic part consists of internal CPU of MSM, NAND and SDRAM. The MSM receives TCXO clock signal, and controls the phone during the PCS, CDMA and the FM mode.

The major components are as follows:

- CPU : ARM926EJ-S CPU core
- MCP(Multi-Chip Package)
 - ? NAND and SDRAM : U102(K5D5657DCM-F015)
 - 256Mbit(32Mx8) NAND Flash / 256Mbit(4Mx16x4 Banks) Mobile SDRAM

CPU(U101:MSM6100-341CSP)

ARM 9 CMOS type 32-bit ARM/16-bit THUMB microprocessor is used for the main processing. The CPU controls all the circuitry. The MSM6100 derives all of its internal clock sources from three clock input TCXO(19.2MHz), SLEEP_XTAL(32.768KHz,in Sleep Mode), 48XTAL(48MHz, If used USB). 32.768KHz is used for sleep mode. This is equipped with the ARM 9 CPU core, CDMA and DFM block, vocoder, general purpose interface and other interfaces. It is one of the most important components of the CDMA cellular phone.

MCP : NAND and SDRAM (U102 : K5D5657DCM-F015)

Memories consist of 256Mbit NAND Flash Memory and 256Mbit synchronous high data rate Dynamic RAM. In 256Mbit NAND Flash, a (512+16)Byte page program can be typically achieved within 200us and (16K+512)Byte block erase can be typically achieved within 2ms. In serial read operation, a byte can be read by 50ns. IO pins serve as the ports for address and data input/output as well as command inputs. In 256Mbit SDRAM, Synchronous design make a device controlled precisely with the use of system clock and I/O transactions are possible on every clock cycle.

Keypad

For key recognition, key matrix is setup using SCAN(1:7) and KEYSense(0:3) of input/output ports of MSM. 16 backlight LEDs and back-light circuitry are included in the keypad for easy operation in the dark.

LCD Module

The Subscriber Units should have a 65K color TFT LCD of Main(176x220 pixels) and Sub(96x96 pixels). The display shall be capable of presenting animation.

5-1-3. Baseband

Mobile System Modem(MSM)

The MCU equipped with the ARM 9 CPU core is an important component of the CDMA cellular phone. The MSM comes in a 341-Ball CSP Package.

MICROPROCESSOR INTERFACE

The interface circuitry consists of reset circuit, address bus(A0-A14), data bus(D(0:15), D2(0:15)), and memory controls (DRAM_RAS, RAM_CS2_N, NAND_CLE, NAND_ALE, ROM_WP).

CODEC

The MSM6100(U101) integrates an audio voiceband CODEC into the Mobile Station Modem. The integrated CODEC contains all of the required conversion and amplification stages for the audio front end.

HPADC

The MSM6100(U101) has an on-chip 8bit analog-to-digital(HPADC) which is intended to digitalize DC signal corresponding to analog parameters such as Battery voltage, Temperature, and RF power levels.

Clock

CPU clock : 19.2MHz. This clock signal from the TCXO

Sleep clock : 32.768KHz. This clock signal is used for sleep.

TCXO/N : 19.2/N MHz. This clock source is used by various blocks of the MSM6100 device, such as the ARM926EJ-S, ringer, UARTs, general-purpose PDMs and the Digital FM circuit. TCXO can be used as a vocoder clock source for EVRC support.

USB clock : 48MHz. This clock signal is used to drive the USB interface on the MSM6100.

RFR6000, SIM8690X and MSM INTERFACE**A. CDMA, FM Data Interface**

- I_OUT, I_OUT_N and Q_OUT, Q_OUT_N(U402) :

Differential output for I and Q component used during CDMA and FM mode.

- RX_IDATA (U401 pins 30-31) and RX_QDATA(U401 pins 33-34) :

RX data bus used during CDMA.

B. Clock

- TCXO : 19.2 MHz is used in CDMA mode.

C. RF Interface

- TX : TX_AGC_ADJ(U101 pin R24) port is used to control the TX power,
PA_ON_PCS(U101 pin C23) signal used to control the PCS power amplifier and
PA_ON_CELL(U101 pin F24) signal used to control the CDMA power amplifier.

5-1-4. Audio Part

The MSM6100 integrates an audio voiceband Codec into Mobile Station Modem.

The integrated Codec contains of all the required conversion and amplification stages for the audio front end. The Codec operates as a 13bit linear Codec with the transmit(TX) and receive(RX) filters designed to meet ITU-TG.712 requirement. The CODEC contains the software controller amplifier for both the receiving and transmitting sections. Also, the vocoding schemes used will be 13kbps QCELP and 8Kbps EVRC. The QCELP vocoder is based in the MSM internally.

Tx Audio Path

The voice signal from the microphone is inputted to the internal CODEC. The voice signal is then amplified by the internal amplifier and is converted to PCM data to be outputted to the MSM as 13bit data. This data is then processed by the MSM(U101)'s internal.

RX Audio Path

The PCM data from the MSM(U101)'s internal is inputted to the internal CODEC and the data will be decoded by the internal DAC and audio levels are adjusted by the amplifier. The final audio is then sent to the audio receiver.

Buzzer Driving Circuitry

A speaker generates alert tone and melody. When the MSM(U101) receives the data, it's internal CMX generates alert tone and melody. Ringer signal generated in MSM6100 is intended to drive a speaker.

Key Tone Generator

The CODEC data out from the MSM6100 is converted to DTMF signal by TONE generator of internal CODEC, is then amplified by the internal audio amplifier to be sent to the speaker unit.

Digital FM Block

The digital FM processor is included in the MSM6100.

FM Transmit Processor**A. Pre-Emphasis Circuit**

This part features +6dB/oct to reduce signal loss and noise in Tx path.

B. Compressor

The compressor features 2:1 level compressor to reduce signal loss and noise in Tx path. The zero crossing level of the compressor is ± 2.9 kHz/dev, attack time is 3ms, and release time is 13.5ms.

C. Limiter

The limiter performs to cut ± 0.53 Vp-p or higher audio signal level so that the FM frequency deviation is not over ± 12 kHz/dev. The function is used to avoid confusion over phone line LPF is used to reduce a specific high frequency of limited signal.

FM Receiver Audio Path

A. De-Emphasis Circuit

This part features -6dB/oct filter to reduce signal loss and noise in Rx path.

B. Expander

The expander features 1:2 level increaser to reduce signal loss and noise in Rx path.

The zero crossing level of the expander is $\pm 2.9\text{kHz/dev}$, attack time is 3ms, and release time is 13.5ms.

5-1-5. TX WBD, ST and SAT

The WBD and ST are generated by the MSM6100 but the SAT is generated by the S1M8690X.

The modulation level of TX WBD and ST is $\pm 8\text{kHz/dev}$ and SAT is $\pm 2\text{kHz/dev}$.

5-2. RF Part

5-2-1. Transmitter

FOR CDMA PCS(1900MHz)

Antenna

Antenna sends signal to the base station and receives the signal from the base station.

It is a tri-band Antenna and covers PCS band, CDMA band, AMPS band and GPS band.

RF Switch

It(U400:TQP4M3018) is used to switch the PCS/AMPS path and the GPS path,

The RF signal pass through PCS/AMPS path when GPS_MODE is low.

Duplexer & Power AMP module

Duplexer(F401:AFEM-7731) allows to transmit only the signals within acceptable Tx frequency range ($1880 \pm 30\text{ MHz}$) through the antenna.

Power amplifier module(F401:AFEM-7731) amplifiers signal to be sent to the base station through the antenna.

RF Band Pass Filter(Tx RF SAW Filter)

The RF BPF(F400:ACPF-7002-TR1) pass only specific frequency($1880\pm 30\text{MHz}$) to send it to power amp(U401:AFEM-7731).

Driver Amp

The driver amp(U402 ; included in S1M8690X) allows the signal to be inputted to the power amp(U401) as a specified level.

Up-converter(Mixer)

The up-converter(U402 ; also included in S1M8690X) receives the local signal $F_{\text{Tx}} * 0.7999$ and signal controlled by TX AGC amp(in S1M8690X) to generate Tx RF signal $1880\pm 30\text{MHz}$ which signal comes out from the mixer output by adding $F_{\text{Tx}} * 0.7999$ local signal.

Automatic Gain Control Amp

The TX IF AGC amp (in S1M8690X) controls gain of AGC to deliver power level needed at driver amp. Its control voltage varies from 0.2V to 2.5V.

For CDMA (800MHz) and AMPS**Antenna**

Antenna sends signal to the base station and receives the signal from the base station. It is a tri-band Antenna and covers PCS band, CDMA band, AMPS band and GPS band.

RF Switch

It(U400:TQP4M3018) is used to switch the PCS/AMPS path and the GPS path, The RF signal pass through PCS/AMPS path when GPS_MODE is low.

Duplexer

Duplexer(F402:SFX836LC601) allows Rx frequency range($881.49 \pm 12.5 \text{ MHz}$) and Tx frequency range

(836.49 \pm 12.5 MHz) from the antenna to pass through LNA. It also matches LNA input in receiving part and PAM(U401:ACPM-7813) output in transmitter part with the antenna.

Power Amp

Power amplifier module(U401:ACPM-7813) amplifies signal to be sent to the base station through the antenna.

RF Band Pass Filter(Tx RF SAW Filter)

The RF BPF(F403:H836NF) pass only specific frequency(836.49 \pm 12.5MHz) to send it to power amp(U504:ACPM-7813-DC1).

Driver Amp

The driver amp(U402 ; included in S1M8690X) allows the signal to be inputted to the power amp(U401) as a specified level.

Up-Converter(Mixer)

The up-converter(U402 ; included in S1M8690X) receives the local signal $F_{Tx} * 1.6666$ and the signal controlled by TX AGC amp(in S1M8690X) to generate Tx RF signal 836.49 \pm 12.5MHz signal comes out from the mixer output by adding $F_{Tx} * 1.6666$ local signal.

Automatic Gain Control Amp

The TX IF AGC amp in S1M8690X controls gain of AGC to deliver power level to be needed at Driver amp. Its control voltage varies from 0.2V to 2.5V.

5-2-2. Receiver

FOR CDMA PCS(1900MHz)

Low Noise Amplifier(LNA)

The low noise amplifier(It is included in FC7510 : U300) amplifies a weak signal received from

the base station to obtain the optimum signal level.

RF Band Pass Filter(Rx RF SAW Filter)

The RF BPF(F301:FAR-F6EB-1G9600-B2BKH) passes only a specific frequency(1960 ± 30 MHz) from the signal received from the mobile station. The bandwidth is 60 MHz.

Down Converter(MIXER)

The local signal is applied to the down converter in RFR6000 : U301

This component converts the RF signal from the LNA to baseband signal.

The baseband signal is made by subtracting local signal($F_{Rx} * 0.8888$) from RF signal(1960 ± 30 MHz).

For CDMA(800MHz) and AMPS

Low Noise Amplifier(LNA)

The low noise amplifier(It is included FC7510 : U300) amplifies a weak signal received from the base station to obtain the optimum signal level.

RF Band Pass Filter(Rx RF SAW Filter)

The RF BPF in (F300:H881YS) passes only a specific frequency(881.49 ± 12.5 MHz) from the signal received from the mobile station. The bandwidth is 25 MHz.

Down Converter(MIXER)

The first local signal is applied to this down converter in RFR6000 : U301. The down converter converts the RF signal from LNA into baseband signal. The baseband signal is made by subtracting local signal ($F_{Rx} * 2$) from RF signal(881.49 ± 12.5 MHz).

5-2-3. GPS(1575.42MHz)

Antenna

Antenna receives signal from GPS satellites.

It is a tri-band Antenna and covers PCS band, CDMA band, AMPS band and GPS band.

RF Switch

It(U400:TQP4M3018) is used to switch the PCS path and AMPS/CDMA path and the GPS path. The RF signal pass through PCS path when PCS_MODE is high(3.0V). The RF signal pass through AMPS/CDMA path when CELL_MODE is high(3.0V). The RF signal pass through GPS path when GPS_MODE is high(3.0V).

RF Band Pass Filter(Rx RF SAW Filter)

The RF BPF(F302:B9000) passes only a specific frequency(1575.42 ± 2 MHz) from the signal received from the satellite. The bandwidth is 2 MHz.

Down Converter(MIXER)

The first local signal is applied to this down converter in RFR6000 : U301). The down converter converts the RF signal from LNA into baseband analog signal. The baseband analog signal is made by subtracting local signal from the RF signal(1575.42MHz).

5-2-4. PLL Block

Frequency Synthesizer Circuit

The PLL(Phased Locked Loop) block consists of VC-TCXO(OSC301:TOH1920DPH4KRA), PLL in S1M8690X and VCO(OSC300:MQL300A1G75).

Input reference frequency is generated at VC-TCXO and the RF local signal is generated at VCO. PLL compares the two signals and generates the desired signal with a preprogrammed counter which controls voltage.

VC-TCXO

The VC-TCXO (OSC301) is a reference source of the frequency synthesizer. It provides 19.2MHz reference frequency to PLL-IC. It is a voltage controlled temperature compensated crystal oscillator having 19.2MHz ± 2.5 ppm frequency stability over all useful temperature range.

A correct frequency tuning is made by the control voltage.

Voltage Controlled Oscillator

The VCO(OSC300) generates the signal having center frequency 1715 ~ 1788MHz frequency range with the voltage control. The PLL in S1M8690X controls this signal.

5-3. Test Command Table

To change the phone from normal mode to test mode, you should enter the following keys. :

Press [4 7 * 8 6 9 # 1 2 3 5]

1	T_SUSPEND_I	Enter to TestMode
2	T_RESTART_I	Escape from TestMode
3	T_SAVE_VAL_I	Save values to EEPROM
4	T_WRITE_NV_I	Write the EEPROM item
5	T_VOLUME_UP_I	Electric Volume Up
6	T_VOLUME_DOWN_I	Electric Volume Down
11	T_CARRIERON_I	Turn on the carrier
12	T_CARRIEROFF_I	Turn off the carrier
13	T_LOADSYN_I	Load the synthesizer for locking
14	T_CDATA_I	Send TX Control data continuously
15	T_TRK_LO_ADJ_I	Adjust tracking local
16	T_RX_DVGA_OFFSET_I	Adjust Rx DVGA gain offset
17	T_LNA_OFFSET_I	Adjust Rx LNA gain offset
19	T_TX_AGC_ADJ_I	Set Tx AGC code
20	T_TX_CH_FLAT_ADJ_I	Adjust Tx channel flatness
21	T_SIO_MODE_I	Change SIO mode
22	T_TEST_SYS_I	Change band & channel
23	T_MRU2_TABLE_I	Reset MRU
24	T_NAI_SET_I	Factory Default NAI(Temporary)
25	T_SET_BT_I	Set PCS BT
27	T_TX_CH_FLAT_MAX_I	Adjust Tx channel MAX PWR flatness
28	T_TX_CH_FLAT_MIN_I	Adjust Tx channel MIN PWR flatness
29	T_FM_RSSI_RAW_MIN_I	Set FM raw rssi min
30	T_FM_RSSI_RAW_MAX_I	Set FM raw rssi max
31	T_VERSION_I	Send model/sw ver/hw ver/buyer
32	T_SNDNAM_I	Send NAM Information
33	T_SNDVERSION_I	Send Software Version
34	T_SNDESN_I	Send ESN
35	T_WRT_PLINFO_I	Write Product line information
36	T_RD_PLINFO_I	Read Product line information
37	T_REBUILD_I	Rebuilding EEPROM
38	T_PHONE_RESET_I	UI Features reset
41	T_BACKLIGHT_I	Backlight on / off
42	T_LED_I	LAMP on / off

43	T_VIBRATOR_I	Vibrator on / off
44	T_DTMFON_I	Turn on DTMF
45	T_DTMFOFF_I	Turn off DTMF
48	T_CAMERA_FLASH_I	Camera Flash on / off
51	T_BATT_TYPE_I	Check battery type
52	T_READ_BATT_I	Read battery code
53	T_SET_STBY_BATT_I	Adjust Stby batt code
54	T_SET_TALK_BATT_I	Adjust Talk batt code
55	T_THERM_READ_I	Read a thermister
61	T_FM_PWRLEVEL_I	Change AMPS power level
62	T_SET_EXT_AUDIO_I	External audio path on/off
63	T_FM_VCLINE_I	Enetr FM voice state
64	T_ALLPATH_I	Tune on the all audio path
65	T_FM_RX_AUDIO_I	Mute/Unmute rx audio
66	T_FM_TX_AUDIO_I	Mute/Unmute tx audio
68	T_FM_ST_I	Turn on/off ST
69	T_FM_SAT_I	Turn on SAT
70	T_FM_COMPAND_I	Turn on compandor
71	T_FM_ST_GAIN_I	Adjust FM ST gain
72	T_FM_SAT_LEVEL_I	Adjust FM SAT level
73	T_FM_FREQ_SGAIN_I	Adjust FM frequency sense gain
74	T_TX_LIMITER_I	Adjust Tx Limiter
75	T_VOC_PCM_LOOP_I	Turn on/off to play a PCM LOOP BACK
78	T_SND_SND_CAL_I	Set voice rx gain
79	T_SND_RING_CAL_I	Set Ring margin gain
81	T_GPSONE_MODE_I	Set single/continuous mode
82	T_GPSONE_GPS_RF_DELAY_FOR_PCS_I	GPS rf delay in pcs mode
84	T_GPSONE_ACCURACY_I	GPS ACCURACY
85	T_GPSONE_ANT_OFF_DB_I	Set gps antenna offset.
86	T_GPSONE_LO_BIAS_UPDATE_CNT_I	Set gps local bias update counter
87	T_GPSONE_GPS_LO_CAL_I	Set gps local calibration value.
88	T_GPSONE_GPS_RF_LOSS_I	Set gps rf loss
89	T_GPSONE_GPS_RF_DELAY_I	Set gps rf delay
90	T_GPSONE_CDMA_RF_DELAY_I	Set cdma rf delay
91	T_GET_RX_BASIS_I	get rx_basis_offset (via hfk command only)
92	T_SET_RX_BASIS_I	set rx_basis_offset
93	T_GET_TEMP_VS_FREQ_I	get temp_vs_freqoffset (via hfk command only)
94	T_SET_TEMP_VS_FREQ_I	set temp_vs_freq_offset

95	T_CDMA_RAS_PER_FAC_I	set cdma ras percent factor
96	T_PCS_RAS_PER_FAC_I	set pcs ras percent factor
97	T_CDMA_CH_PER_FAC_I	set cdma channel percent factor
98	T_PCS_CH_PER_FAC_I	set pcs channel percent factor
99		
100	T_READ_ADJUST_VAL_I	Read rf calibration value.
101		
102		
103	T_GET_TEMP_VS_PWR_I	get temp_vs_pwr_offset (via hfk command only)
104	T_SET_TEMP_VS_PWR_I	set temp_vs_pwr_offset
105	T_FM_CH_PER_FAC_I	set amps_percent factor
106		
107		
108		
109		
110	T_TXRAS_ADJ_I	
111	T_TEST_SET_LNA_RANGE_I	set lna range
112	T_SET_LNA_RISE_FALL_I	lna rise setting
113	T_SET_ADJUST_VAL_I	set Dvga,LNA offset setting
114	T_SET_PDM_VALUE_I	set pdm value
115	T_READ_ADC_PWR_I	read ADC_Fwd,ADC_Rev
116	T_NV_MAJVER_I	
117	T_HW_VER_I	
118	T_OTKSL_EDIT_I	
119		
120	T_2ND_TXRAS_ADJ_I	
121	T_SET_PA_R1_R0_I	
122	T_CENTER_ADJ_I	
123		
124		
125		
126		
127	T_NV_ENUM_INFO_I	
128	T_SET_RDF_PATH_I	Change RDF file path
129	T_CLEAR_MEMORY_I	
130		

131		
132		
133		
139	T_READ_BACKUP_I	read abckup items
140	T_NV_BACKUP_ERASE_I	erase backup items
143	T_VIBRATOR_ON_I	turn vibrator on
144	T_VIBRATOR_OFF_I	turnvibrator off
149		
150	T_MAX_I	

6. Test Procedure

6-1. List of Equipment

DC Power Supply

Test Jig

Test Cable

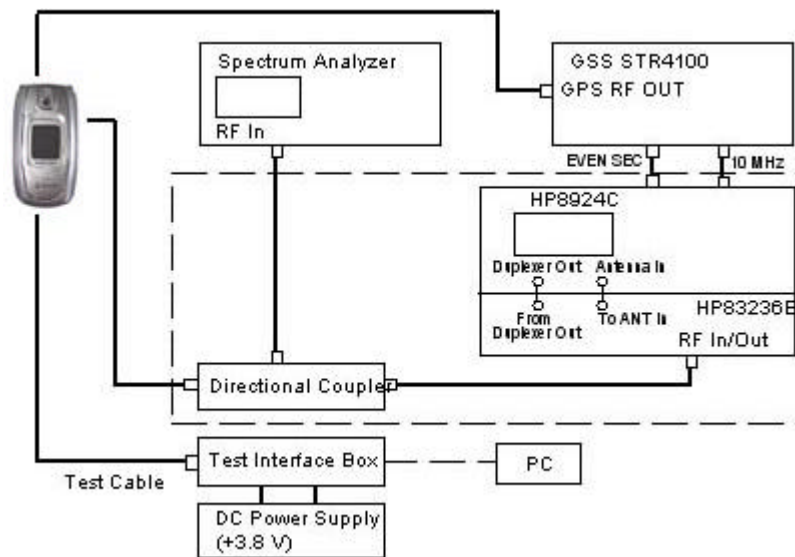
CDMA Mobile Station Test Set

HP8285A, HP8960, CMD-80, etc

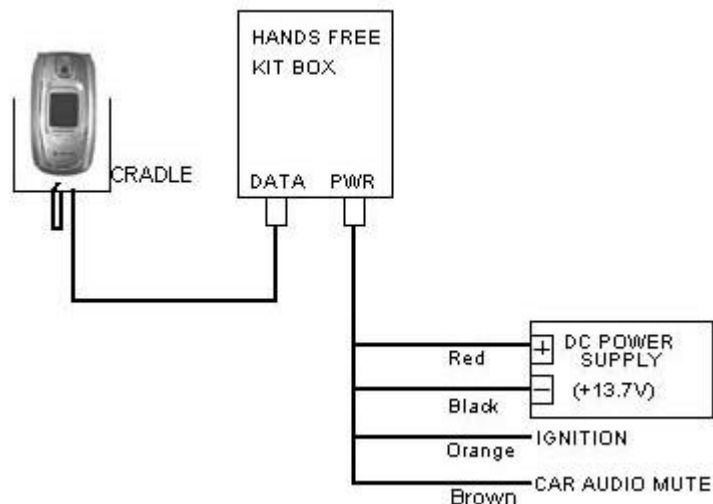
Spectrum Analyzer(include CDMA Test Mode) HP8596E

6-2. Configuration of Test

6-2-1. Hand Set

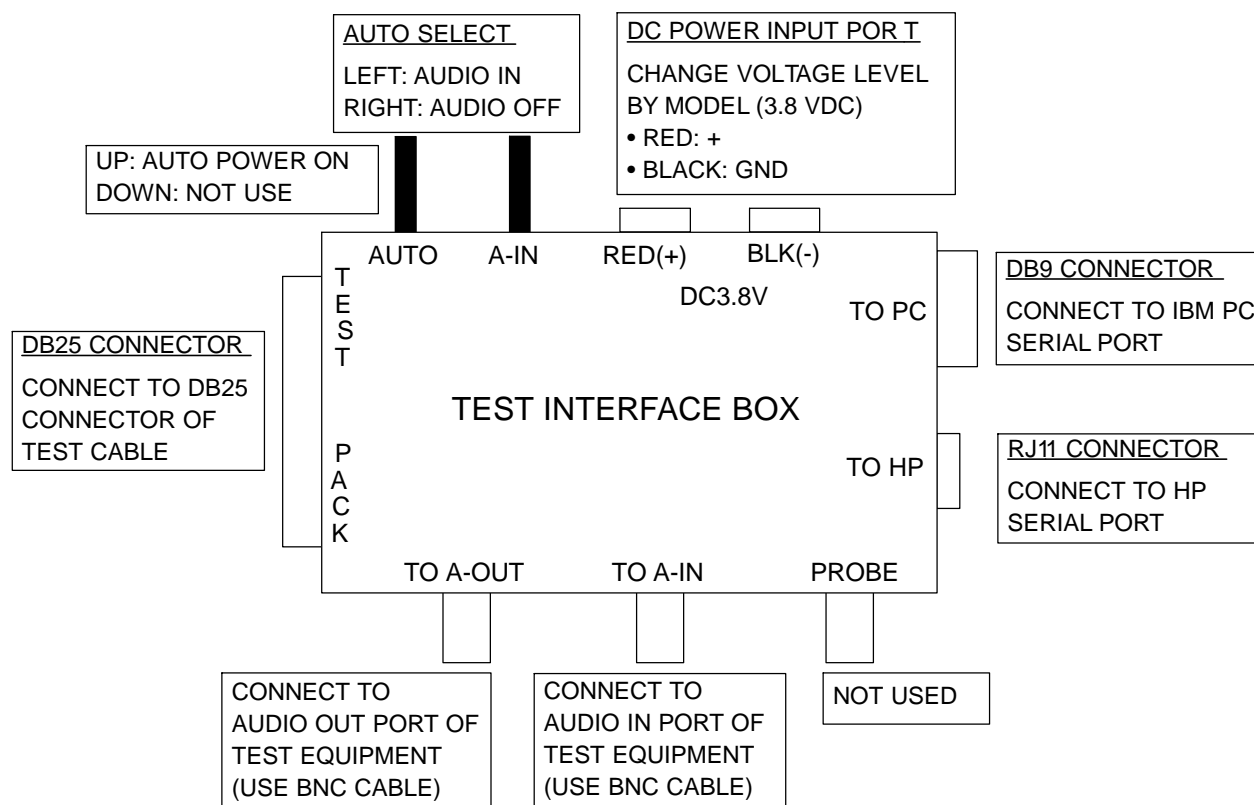


6-2-2. Hands-Free

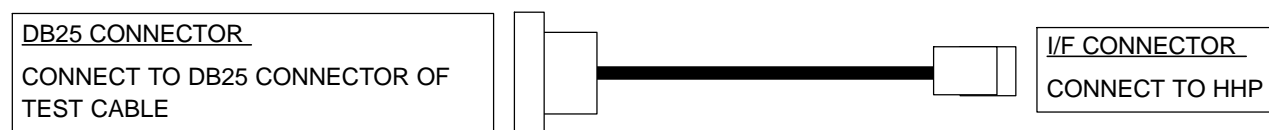


6-2-3. Test Cable Connection Diagram

TEST INTERFACE BOX



TEST CABLE



Items needed to purchase from SAMSUNG

ITEMS	PARTS#	REMARK
TEST CABLE	GH39-00172A	*Cable Loss : 1.9 GHz(PCS) 2.1dB, 800 MHz(Cellular) 1.4dB (1.8m)
TEST INTERFACE BOX	GH80-00001A	Including 1. Power Cable(Black, Red) 2. 9-pin RS 232 Cable for PC
DM Cable	GH59-00054A	Connection between Phone and PC

6-3. Test Procedure

6-3-1. Change the test mode

A. To change the phone from normal mode to test mode, you should enter the following keys.

: Press [4 7 * 8 6 9 # 1 2 3 5]

B. The command [0 0 1] (Suspend) is entered to start test.

: Press [0 0 1]

C. To finish the test mode, you should enter the command [0 0 2]

: Press [0 0 2]

6-3-2. Channel selection and Tx power output level control

1.9 GHz (PCS)

A. To select PCS mode, you should enter the following keys.

1) Press [4 7 * 8 6 9 # 1 2 3 5]

2) Press [0 2 2 3 0 0 0 0] + [OK] + [0 0 2]

B. You should change the phone from normal mode to test mode

: Press [4 7 * 8 6 9 # 1 2 3 5]

C. You should change [0 0 1] (Suspend) is entered to start test.

: Press [0 0 1]

D. You should enter the following keys.

: Press [0 1 3 0 6 0 0] + [#] + [0 1 1] + [0 1 4]
+ [0 1 0 1] + [#] + [0 1 9 3 0 0]

. If you enter the command [0 1 3] you can select the channel.

ex) [0 1 3 X X X X] ; Under bar means channel number, and channel number must be 4 digits.

. The command [0 1 1] means carrier on.

. If you enter the command [0 1 4] you can spread the carrier.

. If you enter the command [0 1 0 X] you can set PA gain mode, and number must be 0 or 1.

0 means low gain mode, and 1 means high gain

mode.

. If you enter the command [0 1 9] you can control the power output level. Following under bar means AGC code. And you can control the power output level using [TALK]/[END/] keys.

ex) [0 1 9 X X X]

. [#] key means the escape of current command.

800 MHz CELLULAR (AMPS)

A. To select AMPS mode, you should enter the following keys.

1) Press [4 7 * 8 6 9 # 1 2 3 5].

2) Press [0 2 2 1 0 0 0 0] + [OK] + [0 0 2]

ex) [1 0 0 0 0] means SYS_A, and [1 0 0 0 1] means SYS_B.

B. You should change the phone from normal mode to test mode.

: Press [4 7 * 8 6 9 # 1 2 3 5]

C. You should enter the following keys.

: Press [0 1 3 0 3 6 3] + [#] + [0 1 1] + [0 1 9 3 0 0]

. If you enter the command [0 1 3] you can select the channel.

ex) [0 1 3 X X X X] ; Under bar means channel number, and channel number must be 4 digits.

. The command [0 1 1] means carrier on.

. If you enter the command [0 1 9] you can control the power output level. Following under bar means AGC code. And you can control the power output level using [TALK]/[END/] keys.

ex) [0 1 9 X X X]

. [#] key means the escape of current command.

800 MHz (CDMA)

A. To select CDMA mode, you should enter the following keys.

1) Press [4 7 * 8 6 9 # 1 2 3 5]

2) Press [0 2 2 2 0 0 0 0] + [OK] + [0 0 2]

B. You should change the phone from normal mode to test mode

: Press [4 7 * 8 6 9 # 1 2 3 5]

C. You should change [0 0 1] (Suspend) is entered to start test.

: Press [0 0 1]

D. You should enter the following keys.

: Press [0 1 3 0 3 6 3] + [#] + [0 1 1] + [0 1 4]
+[0 1 0 1] + [#] +[0 1 9 3 0 0]

. If you enter the command [0 1 3] you can select the channel.

ex) [0 1 3 X X X X] ; Under bar means channel number, and channel number must be 4 digits.

. The command [0 1 1] means carrier on.

. If you enter the command [0 1 4] you can spread the carrier.

. If you enter the command [0 1 0 X] you can set PA gain mode, and number must be 0 or 1.

0 means low gain mode, and 1 means high gain mode.

. If you enter the command [0 1 9] you can control the power output level. Following under bar means AGC code. And you can control the power output level using [TALK]/[END/] keys.

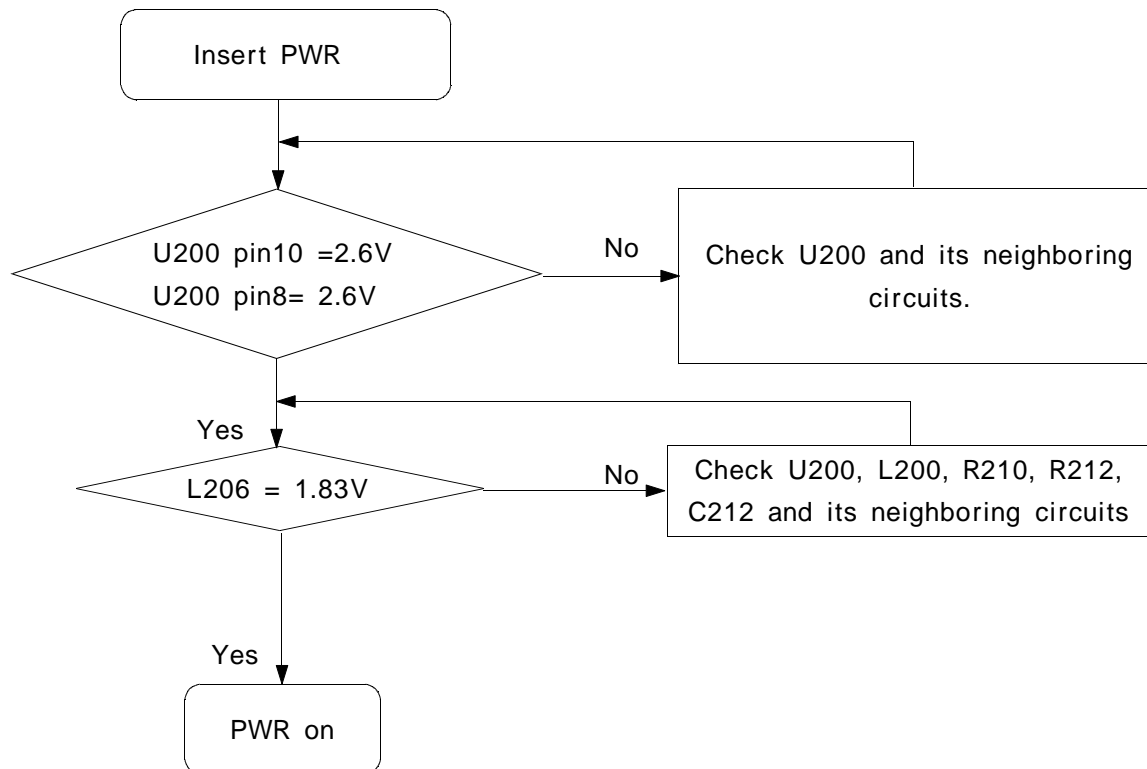
ex) [0 1 9 X X X]

. [#] key means the escape of current command.

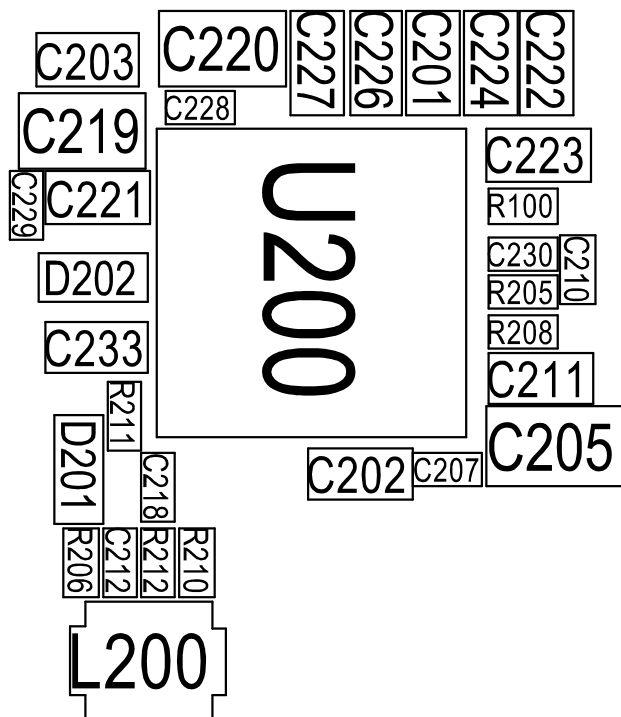
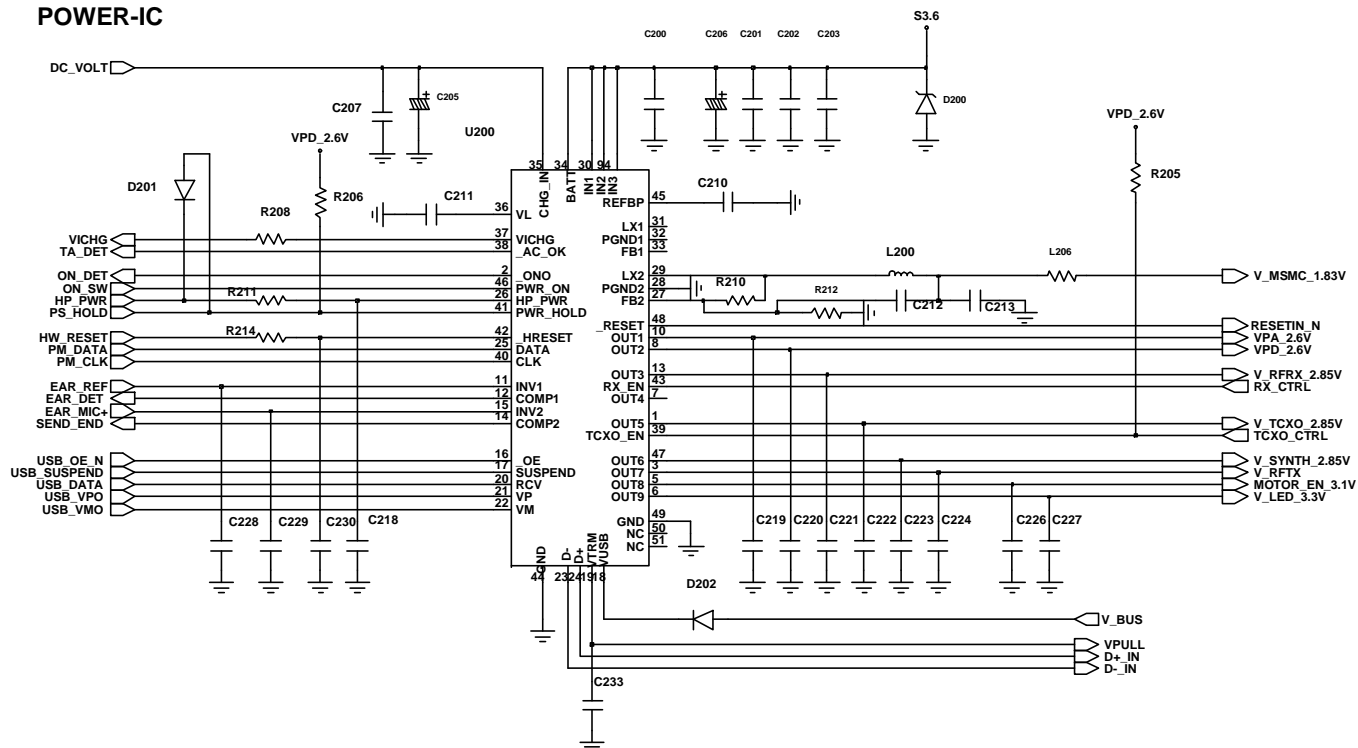
7. Troubleshooting

7-1. Logic Section

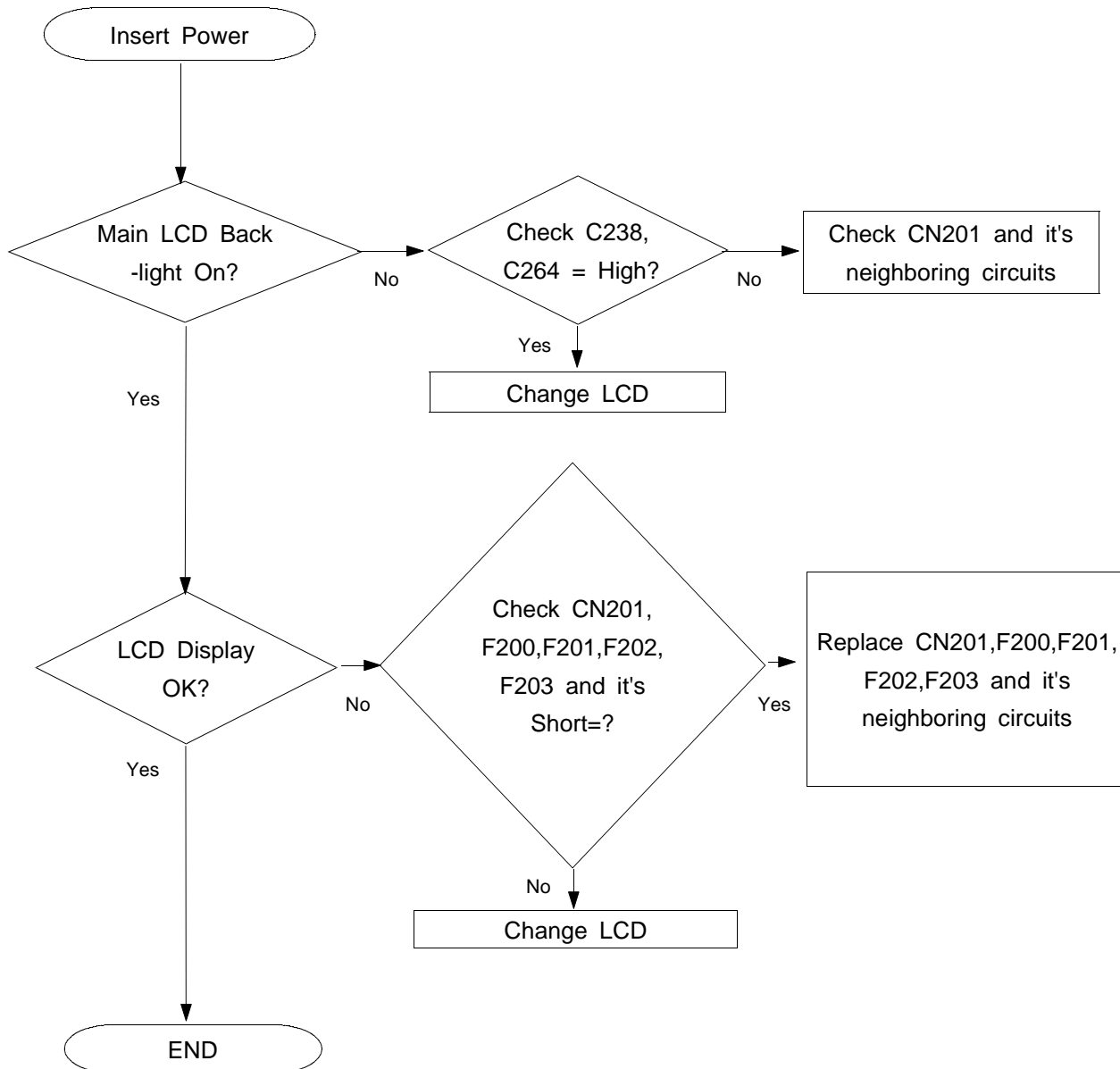
7-1-1. No Power

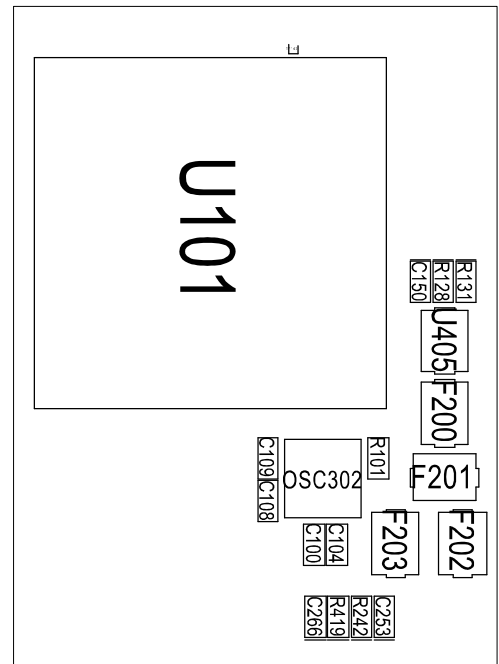
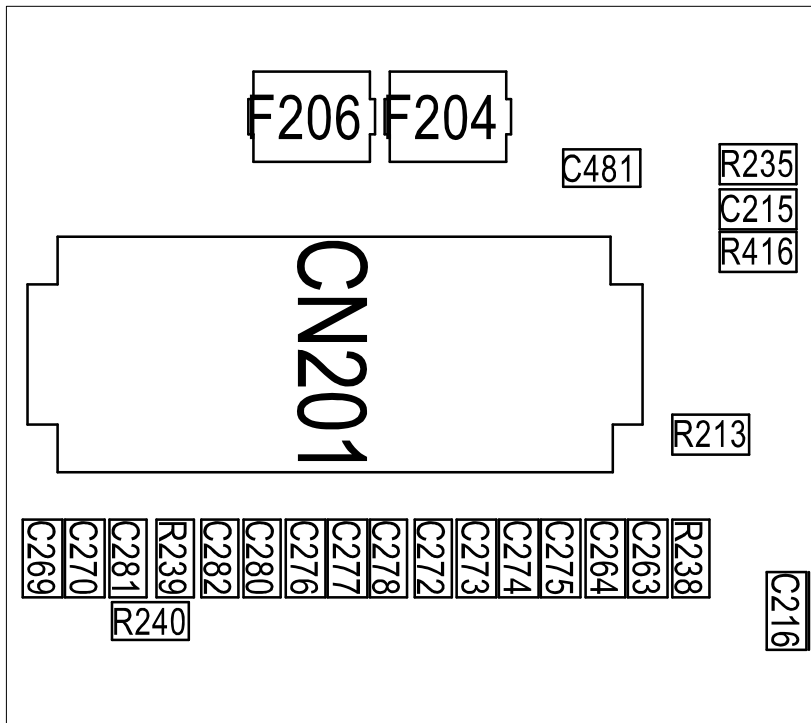
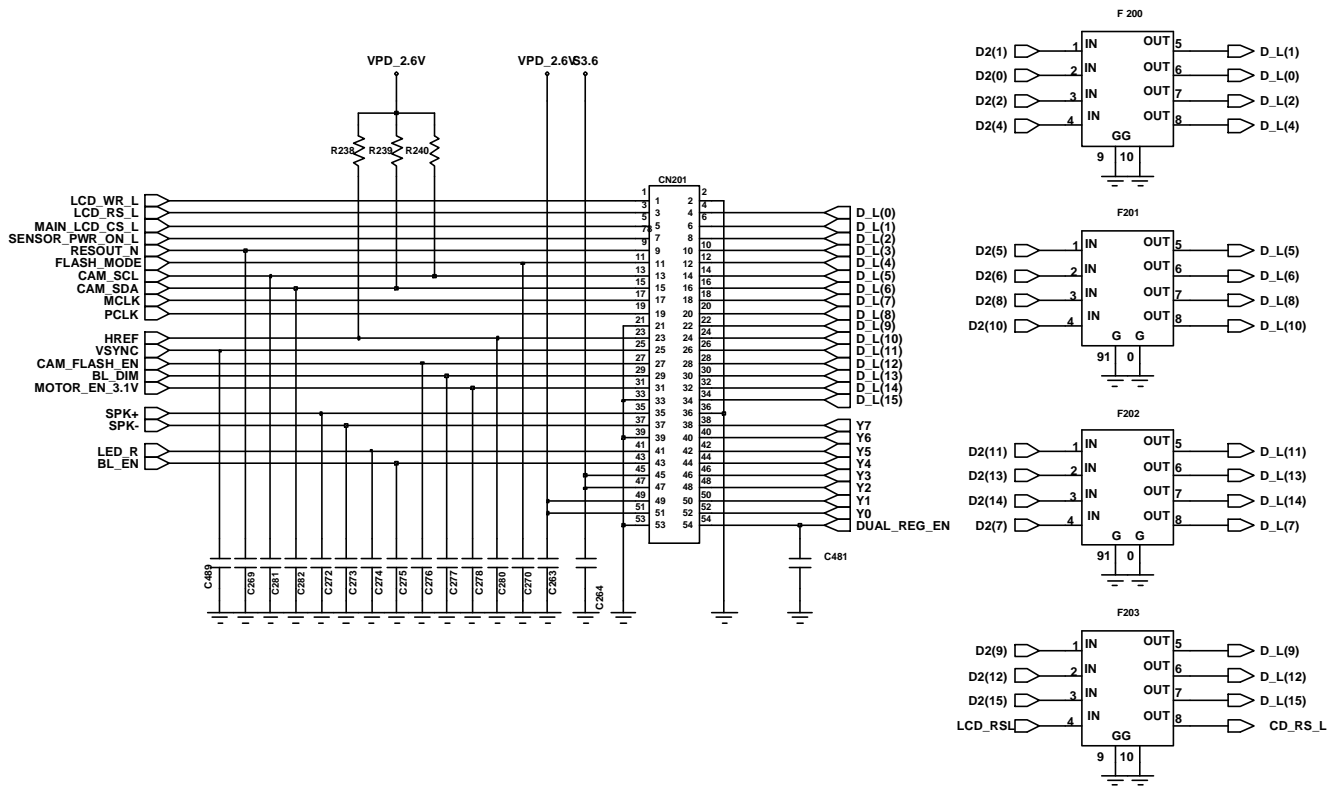


POWER-IC

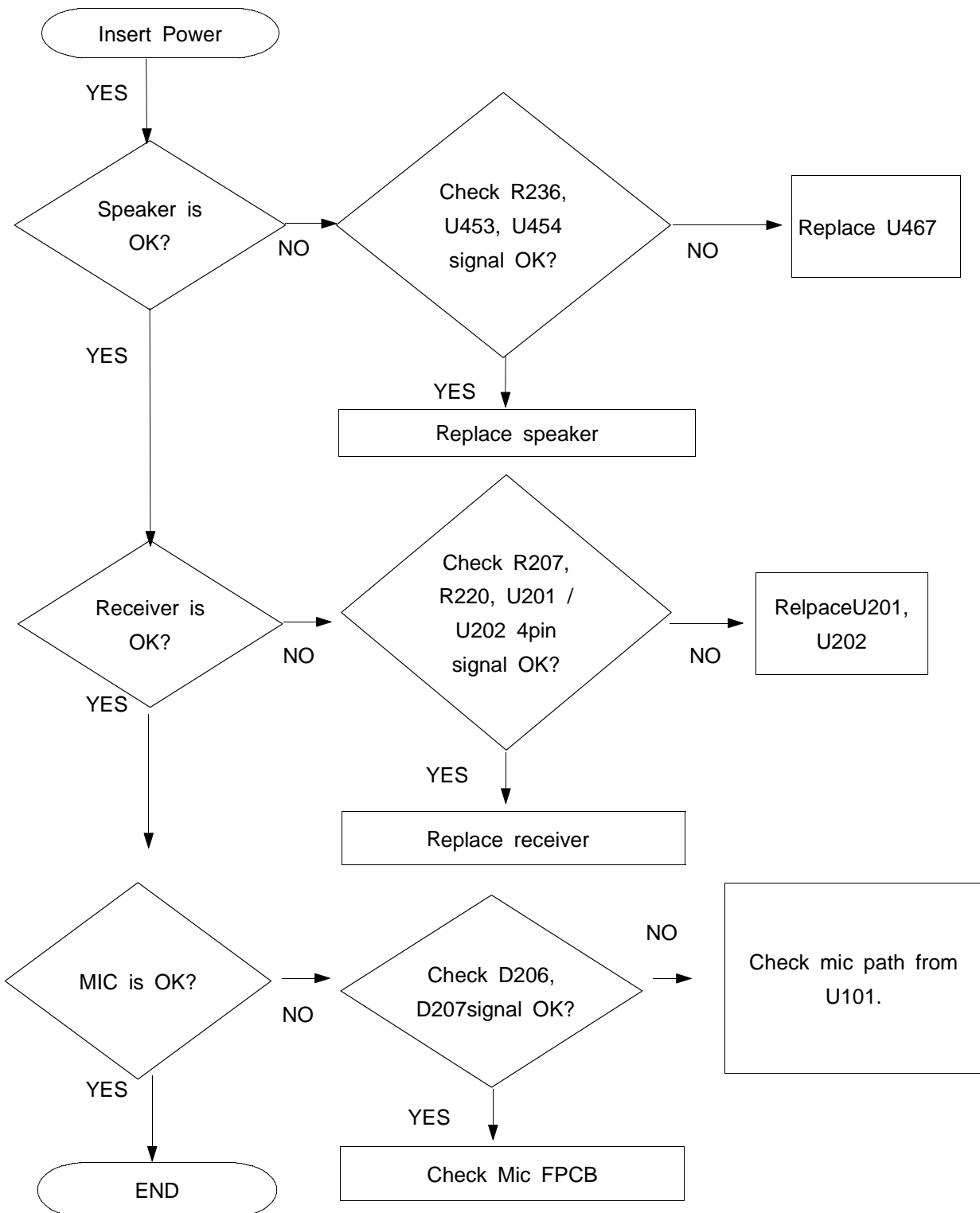


7-1-2. LCD Working

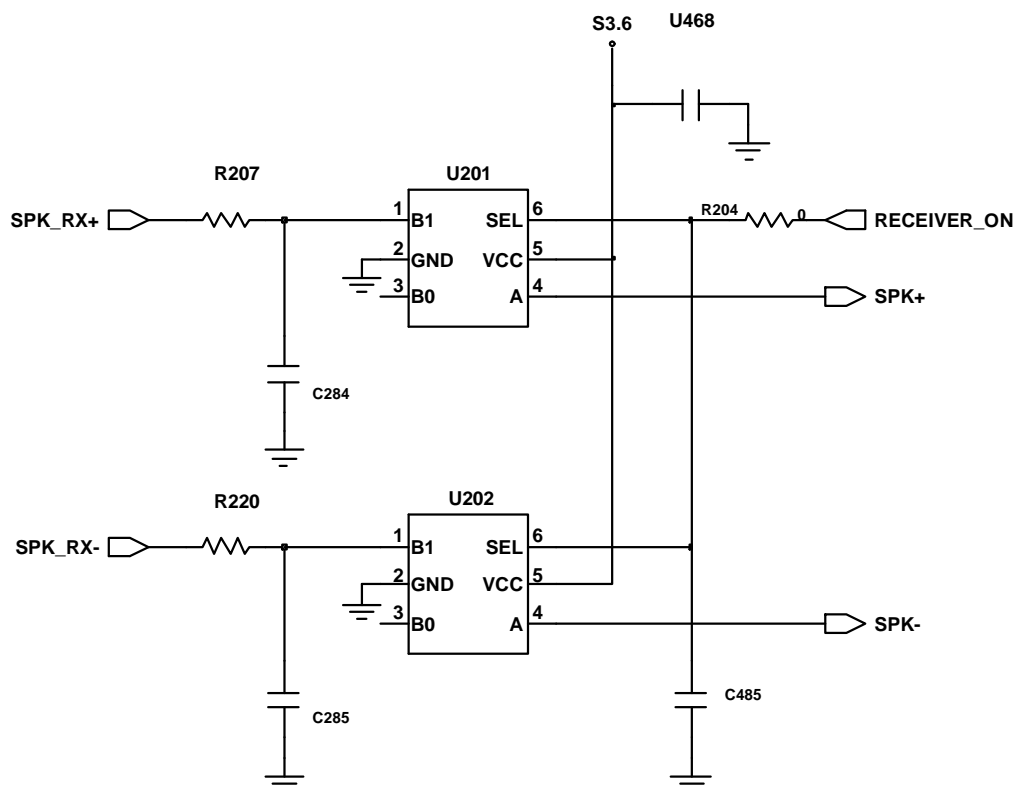
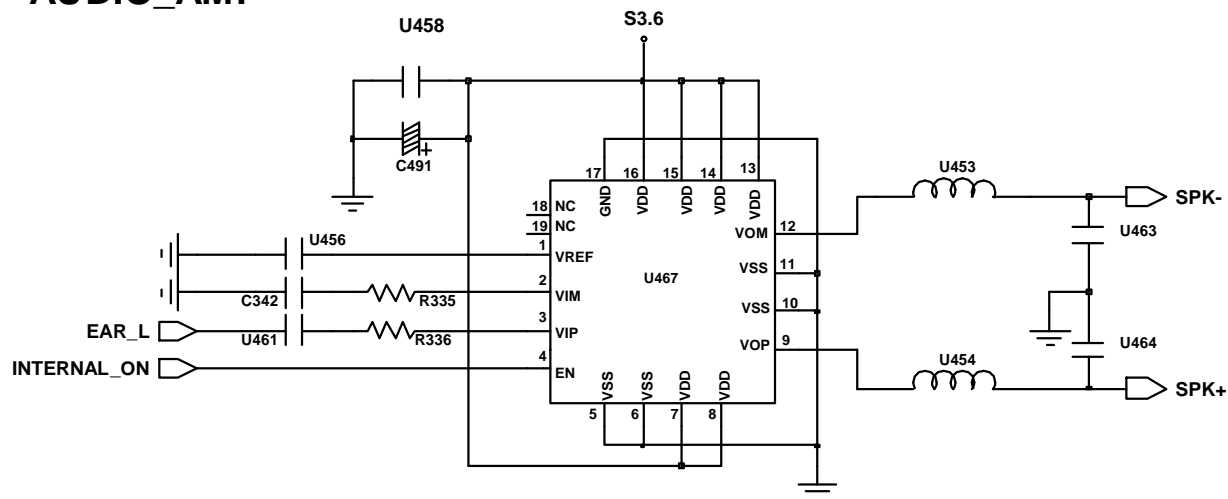


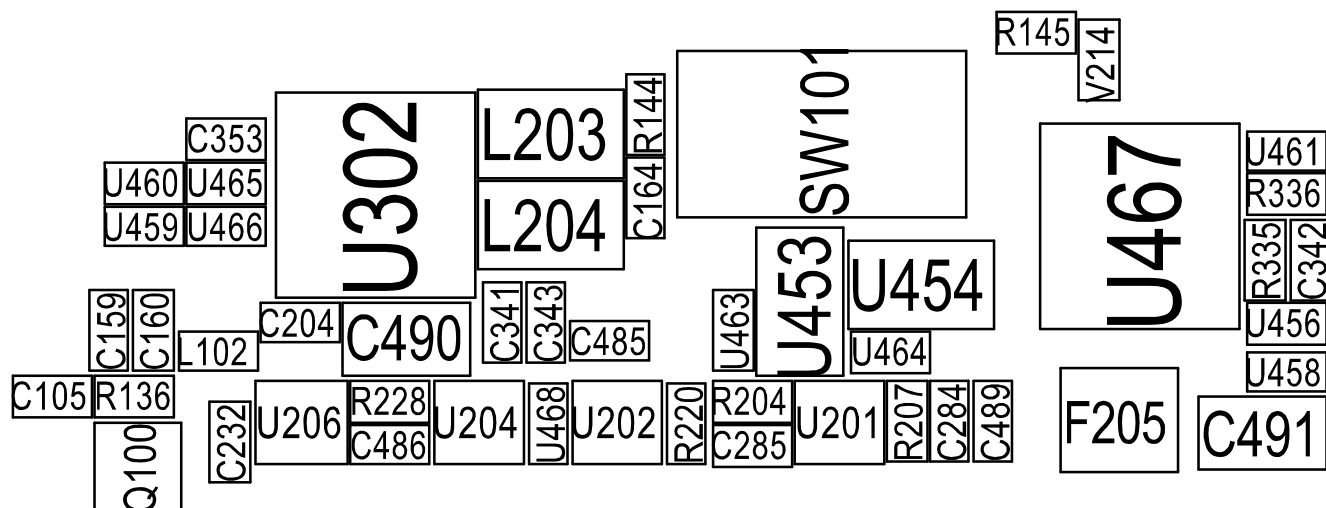


7-1-3 Speaker, Receiver and Mic Checking

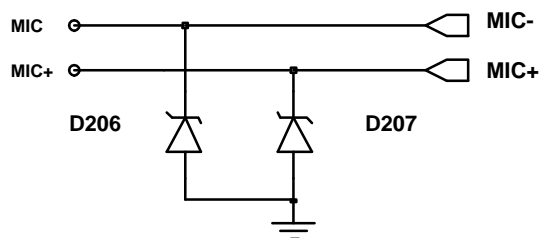


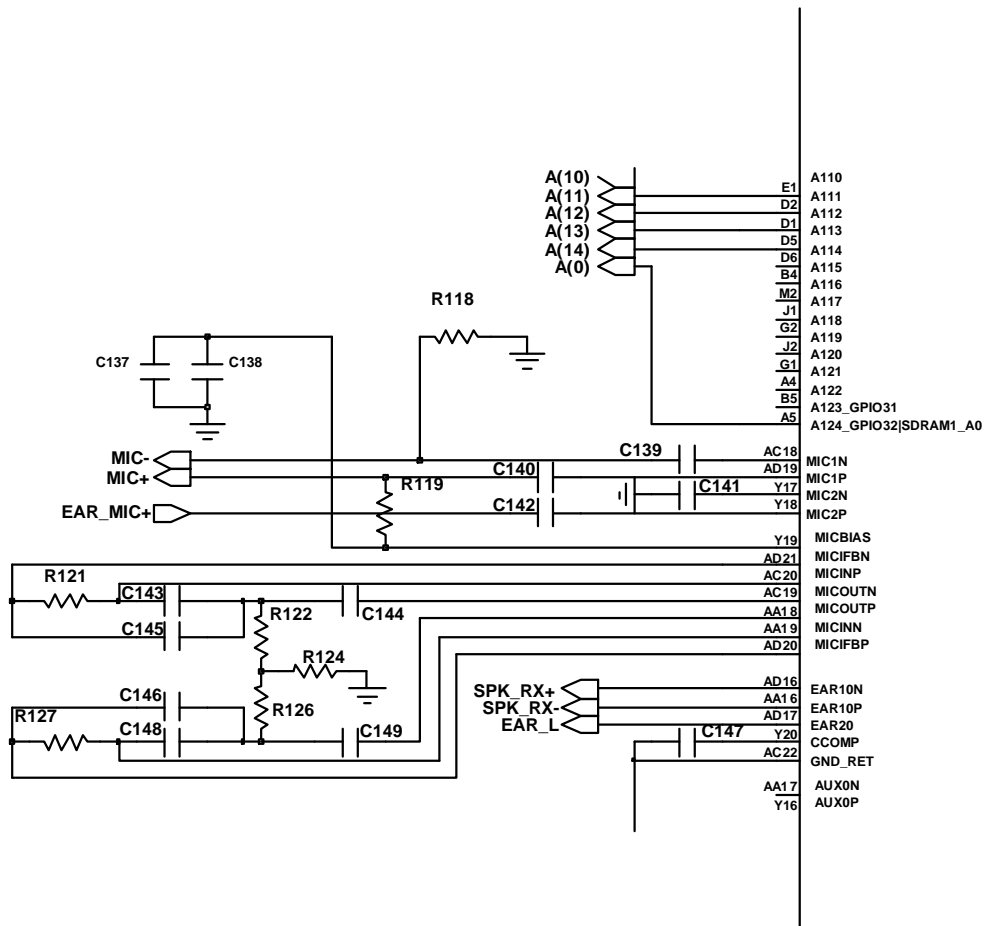
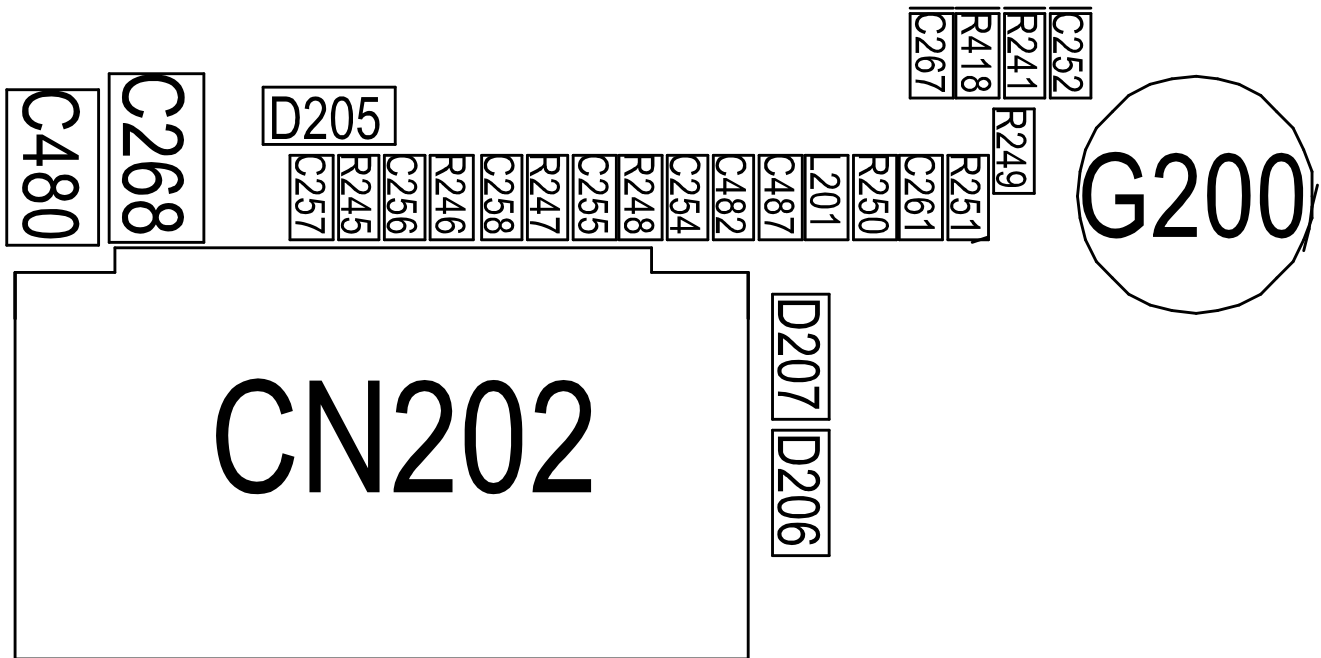
AUDIO_AMP





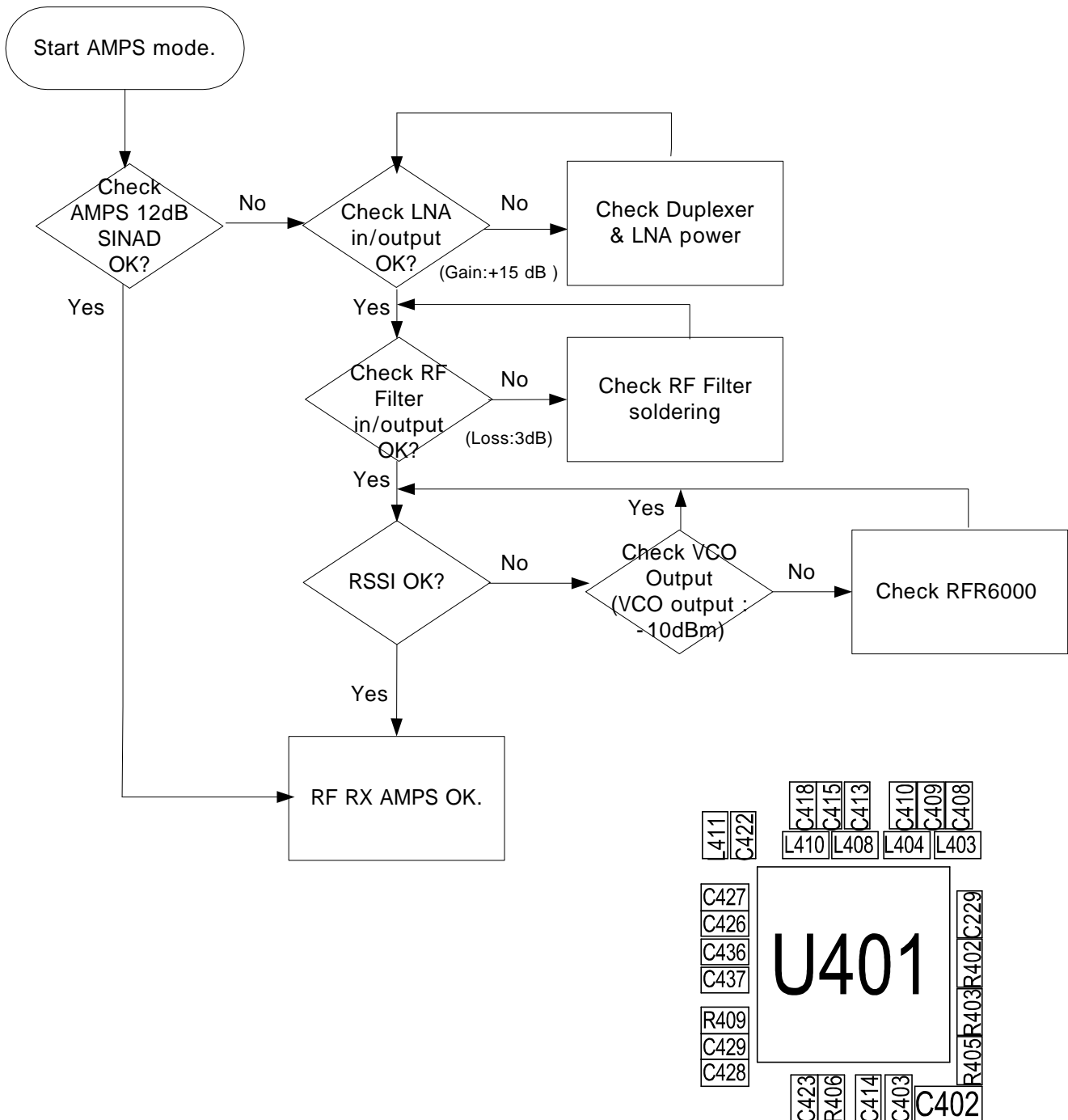
MIC

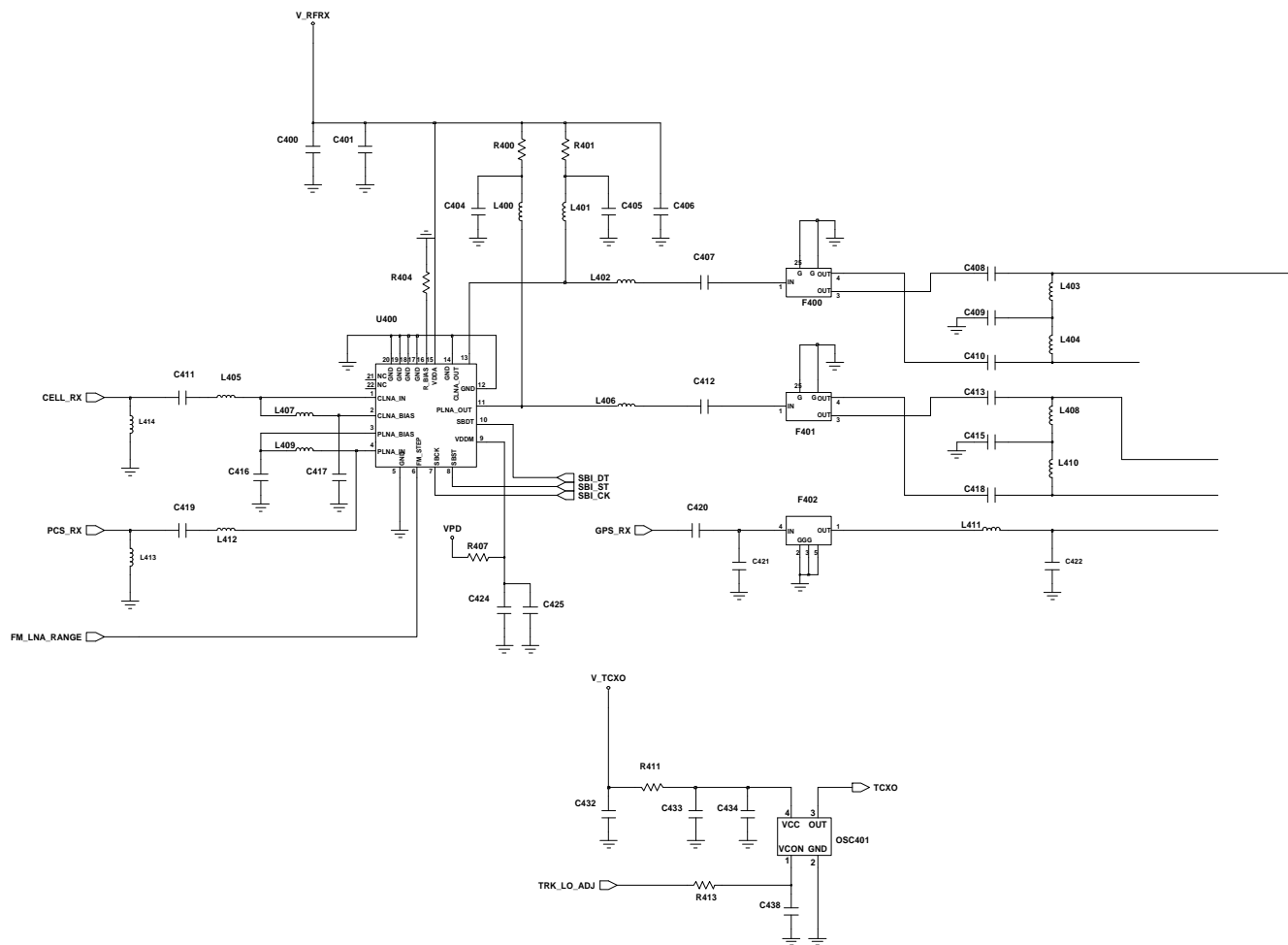




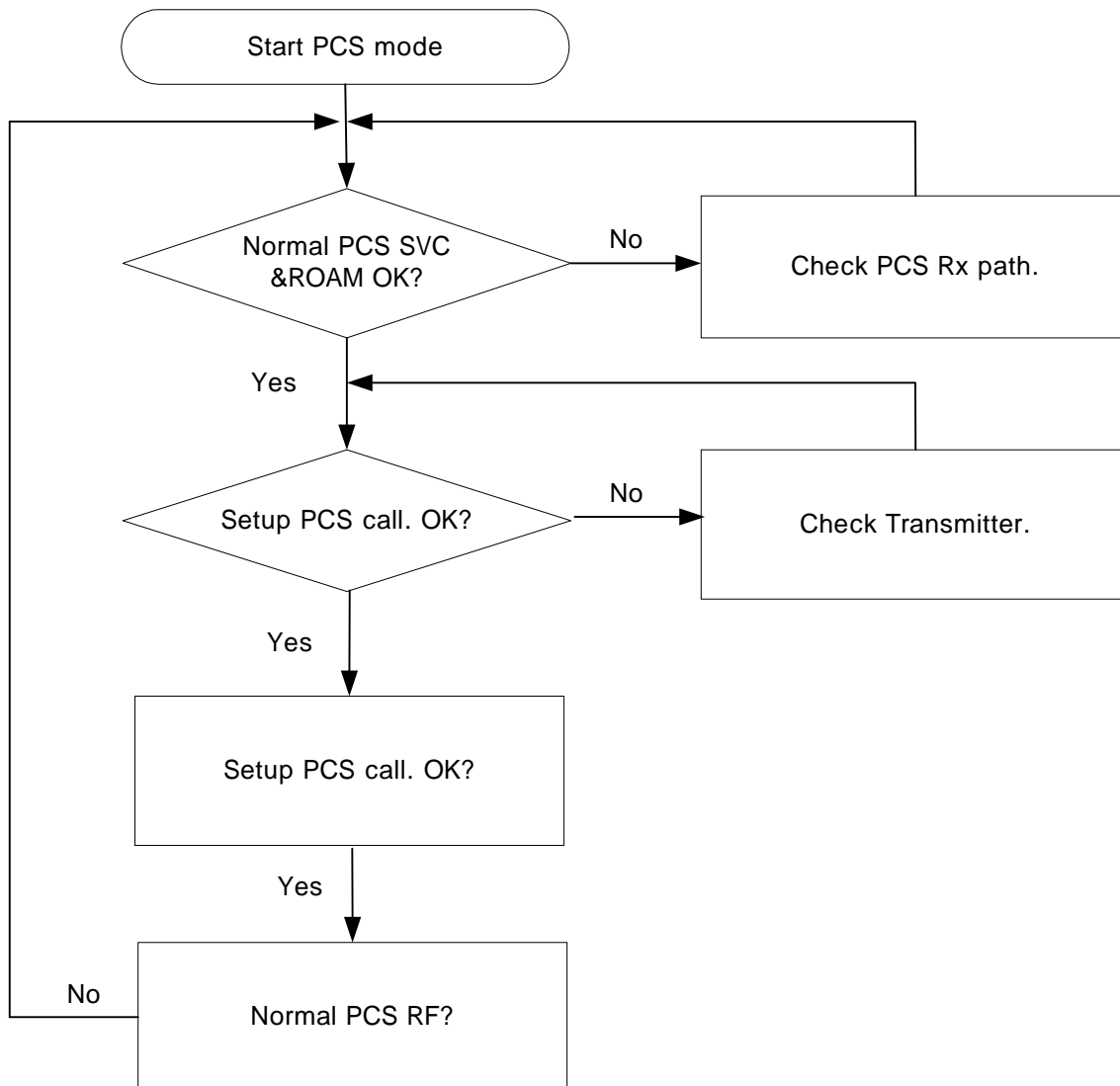
7-2. Receiver Section

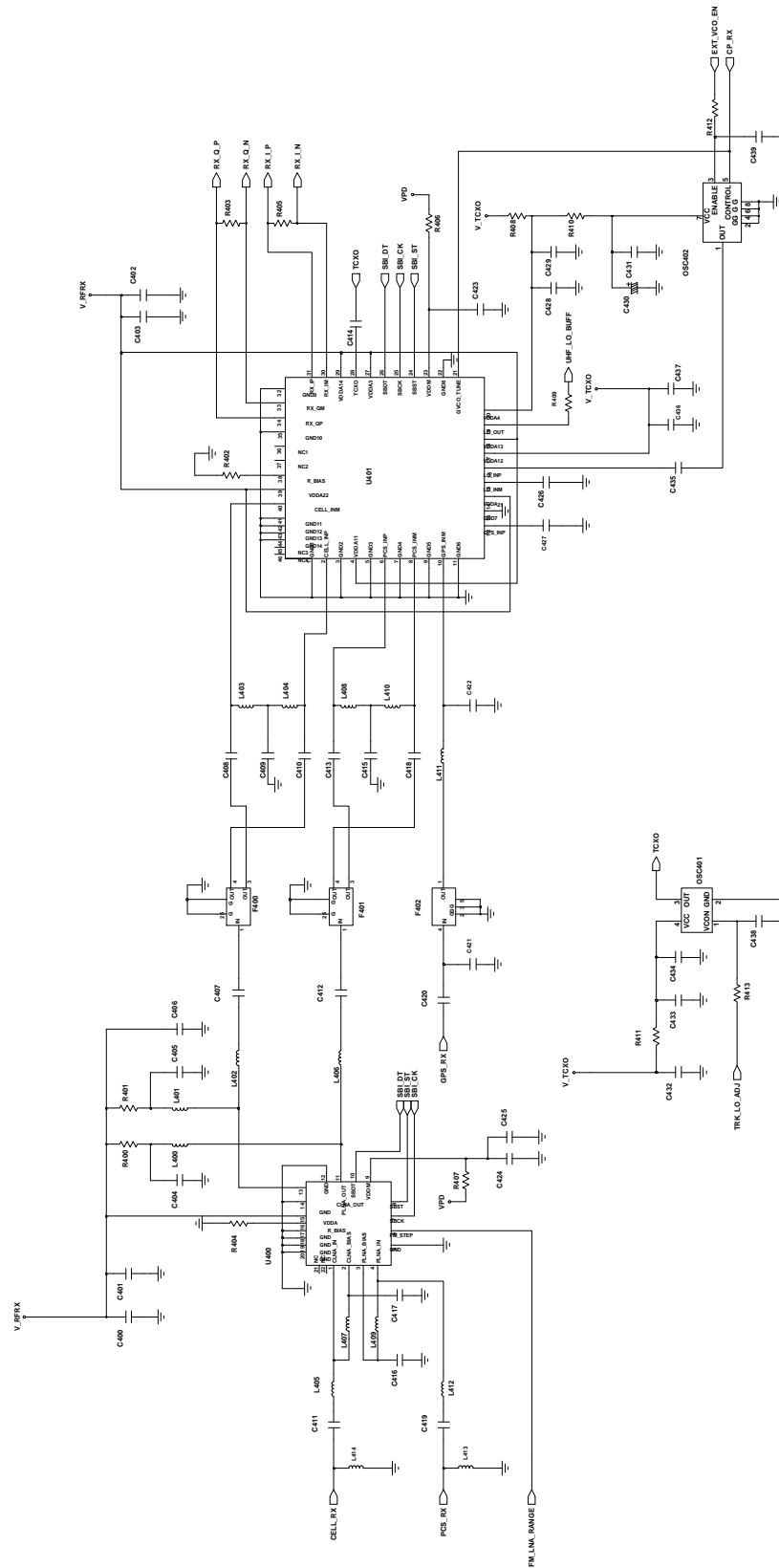
7-2-1. AMPS mode

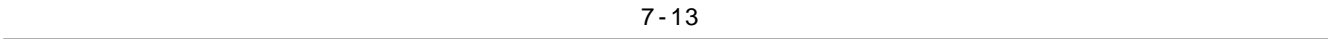




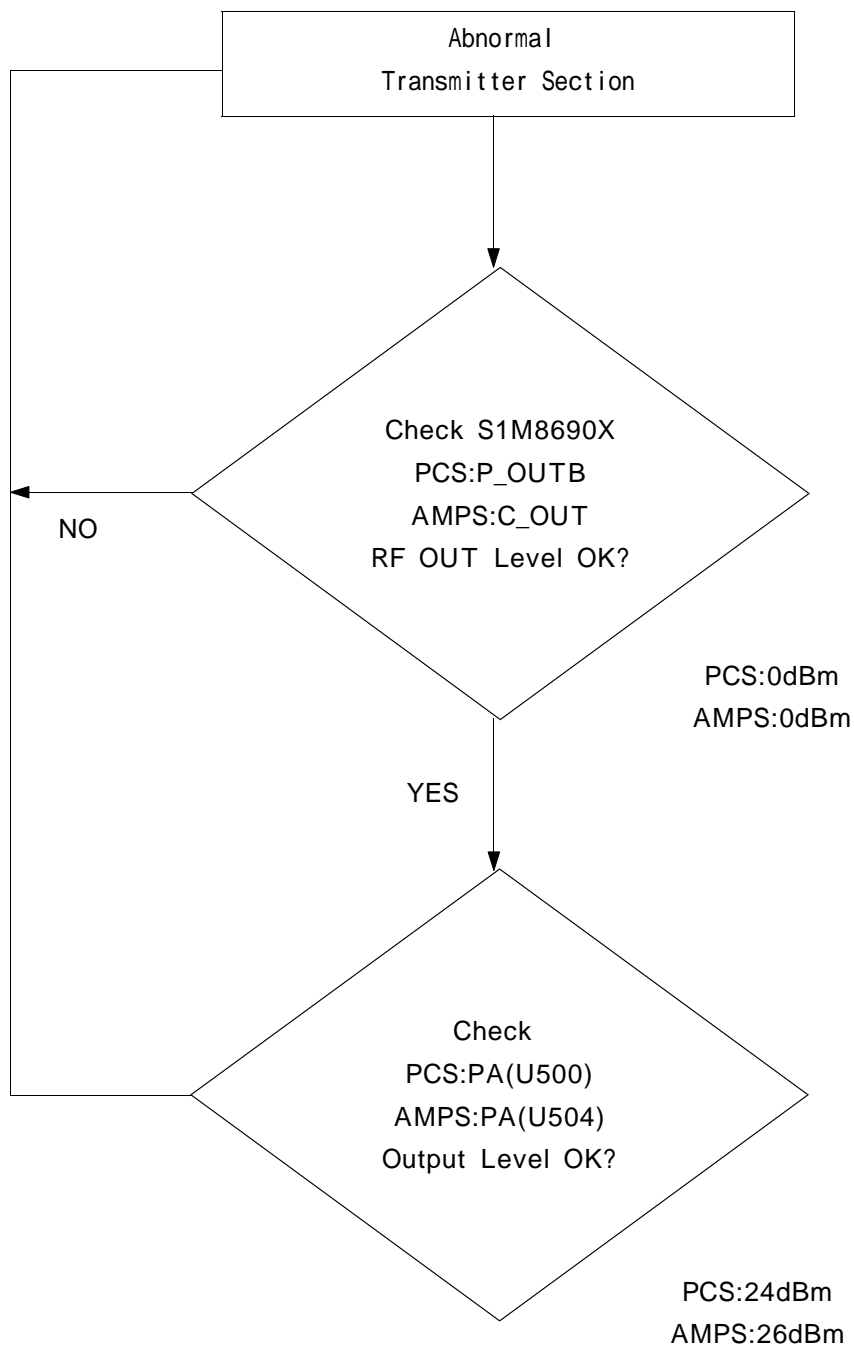
7-2-2. PCS mode

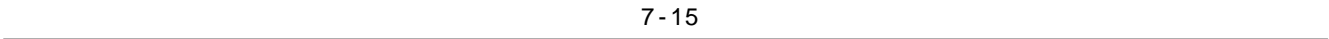


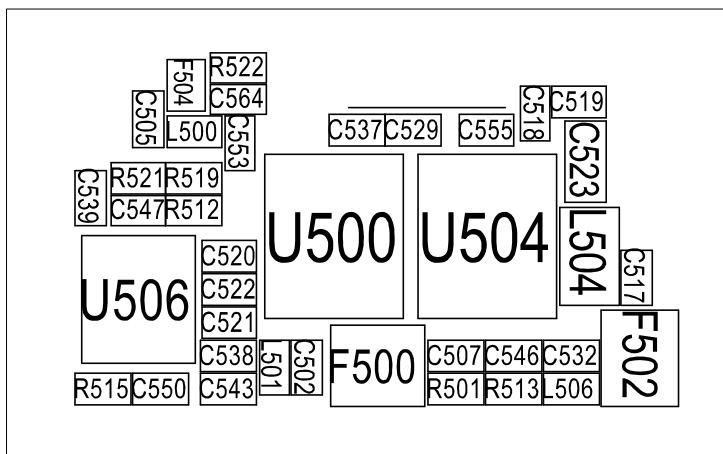
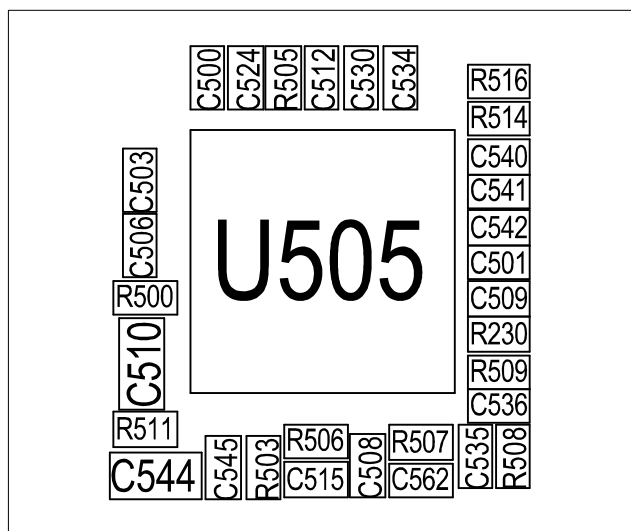




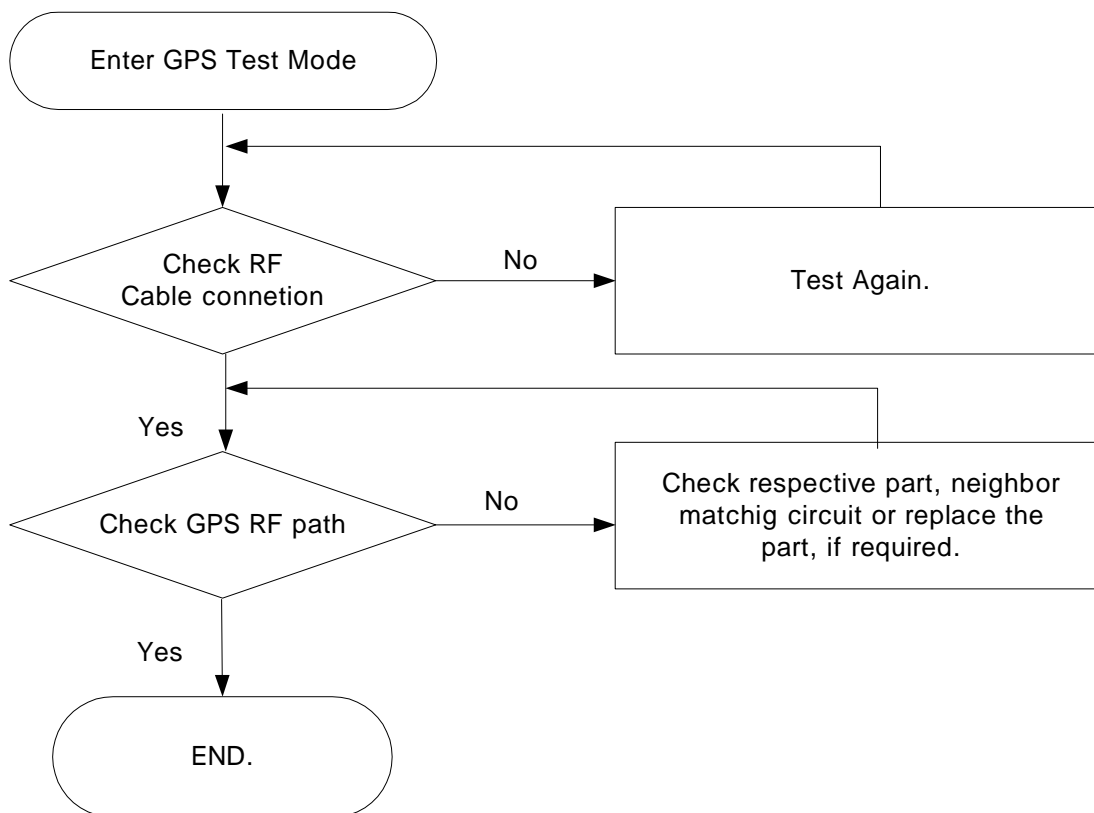
7-3. Transmitter Section

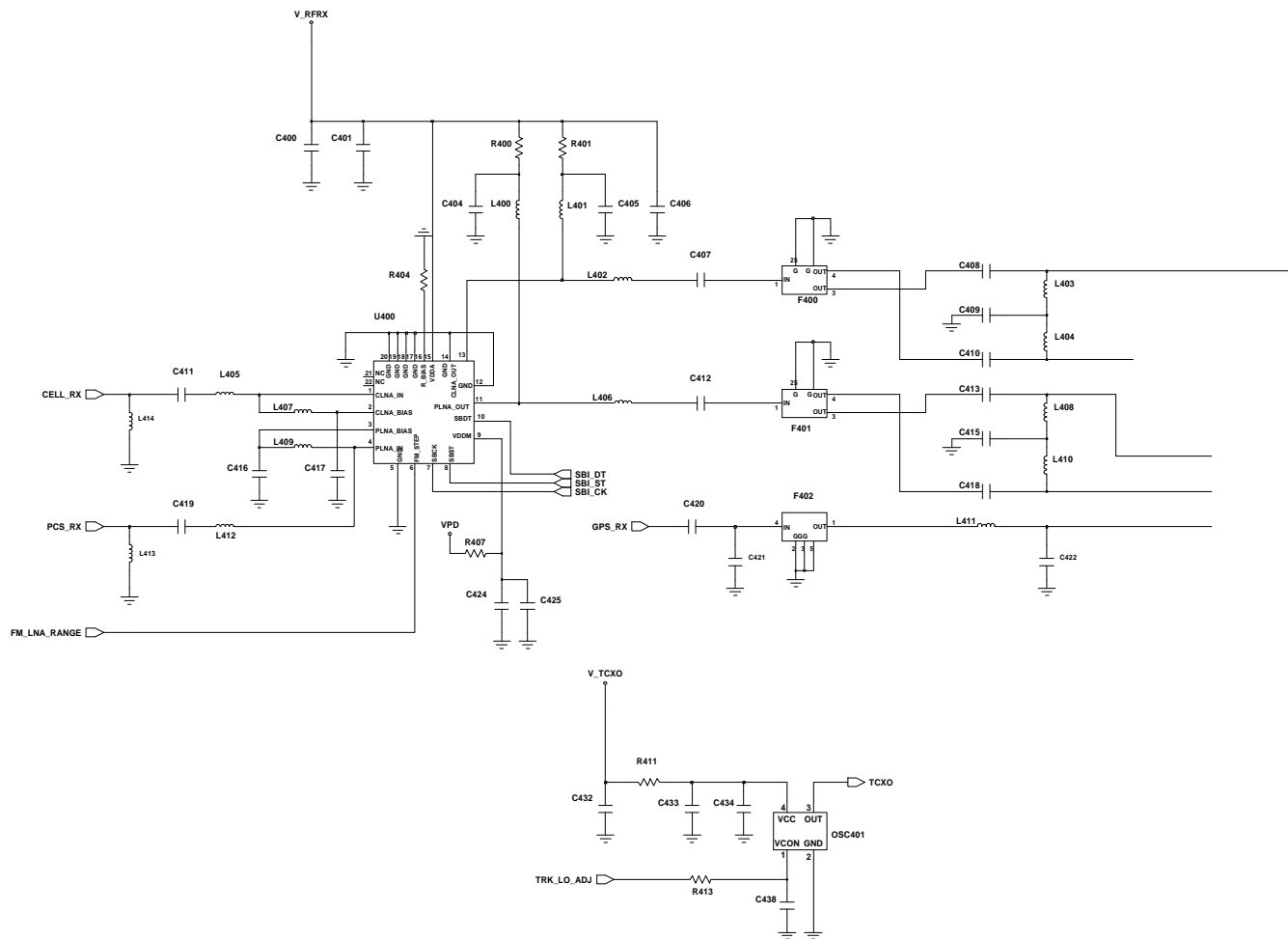






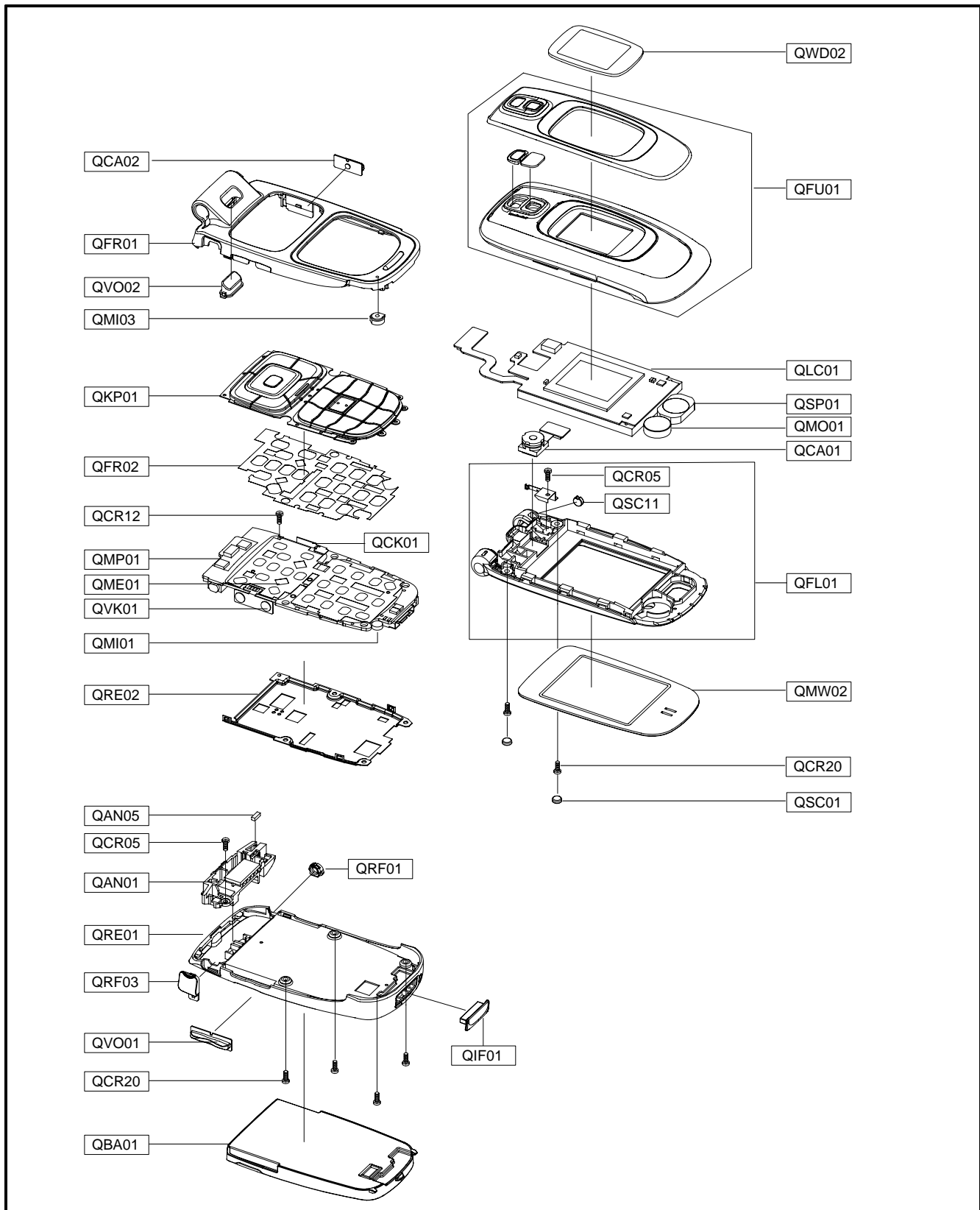
7-4. GPS mode - Low Sensitivity





8. Exploded View and Parts List

8-1. Exploded View

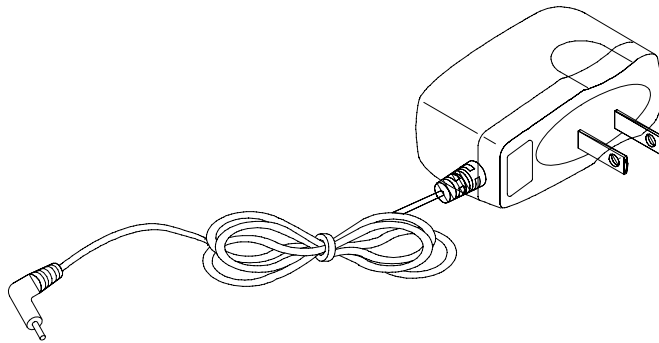


8-2. Parts List

Location NO.		Description	SEC CODE
QAN01		ANTENNA-SPHA880	GH42-00565A
QAN05		RMO-RUBBER INTENNA	GH73-04658A
QBA01		BATTERY-900MAH,L/SIL,SPN,M	GH43-02077B
QCA01		UNIT-CAMERA	GH59-01926A
QCA02		PMO-PHOTO KEY	GH72-19232A
QCK01		UNIT-CAMERA KEY	GH59-01922A
QCR05		SCREW-MACHINE	6001-001478
QCR12		SCREW-MACHINE	6001-001530
QCR20		SCREW-MACHINE	6001-001429
QCR20		SCREW-MACHINE	6001-001429
QFR02		MEC-FRONT SHIELD	GH75-07300A
QIF01		PMO-IF COVER V2(VIVO)	GH72-22511B
QKP01		MEC-KEYPAD(VIVO/ME_SIL)	GH75-07594B
QLC01		LCD-SPHA880, MAIN	GH07-00657A
QME01		UNIT-METAL DOME	GH59-01924A
QMI01		MICROPHONE-ASSY-SPHA880 MIC	GH30-00192A
QMI03		RMO-MIC HOLDER	GH73-04657A
QMO01		MOTOR DC-SPHA880 MOTOR	GH31-00145A
QMP01		PBA MAIN-SPHA880	GH92-02379A
QMW02		PMO-MAIN WINDOW	GH72-24417A
QRE02		MEC-REAR SHIELD	GH75-07238A
QRF01		PMO-COVER RF	GH72-26981B
QRF03		PMO-EAR JACK COVER	GH72-19243B
QSC01		RMO-SCREW CAP	GH73-04498B
QSC11		PMO-HINGE CAP	GH72-19220A
QSP01		SPEAKER	3001-001747
QVK01		UNIT-VOLUMEKEY	GH59-01923A
QVO01		PMO-SIDE KEY(VIVO/SIL)	GH72-19231B
QVO02		MEC-VOD KEY (VIVO/SIL)	GH75-08178B
QWD02		PMO-DUAL WINDOW	GH72-21683A
QFL01		MEC-FOLDER LOWER	GH75-06212B
	QCR05	SCREW-MACHINE	6001-001478
	QSC11	PMO-HINGE CAP(VIVO/SIL)	GH72-19220F
QRE01		MEC-REAR COVER (VIVO)	GH75-07588B
	QRF07	PMO-DC JACK COVER V2	GH72-25723B
QFU01		MEC-FOLDER UPPER(VIVO)	GH75-07853B
	QFB01	MEC-FOLDER DUMMY	GH75-07852A
QFR01		MEC-FRONT COVER	GH75-06213B
	QHI01	MEC-HINGE(CAN TYPE)	GH75-04662A

Description	SEC CODE
BAG PE	6902-000643
ADAPTOR-SCHN375 TA	GH44-00284A
LABEL(P)-WATER SOAK	GH68-02026A
MANUAL-USER	GH68-08055A
LABEL(R)-MAIN(TSP)	GH68-08453B
CUSHION-CASE(NEW 2)	GH69-03077A
BOX(P)-SPHA880(TSP)	GH69-03215B
IPR-LOCKER SPRING	GH70-00157A
RMO-RUBBER QUALCOMM	GH73-04167A
RMO-RUBBER MEMORY	GH73-04168A
RMO-RUBBER PCB CONTACT	GH73-04660A
MPR-TAPE DUAL WINDOW	GH74-14470A
MPR-TAPE HINGE CAP L	GH74-14471A
MPR-TAPE HINGE CAP L	GH74-14471A
MPR-TAPE MAIN WINDOW	GH74-14472A
MPR-TAPE INSULATE PRESS	GH74-14476A
MPR-TAPE INSULATE J TAG	GH74-14477A
MPR-TAPE LCD TOP 1	GH74-14478A
MPR-SPONGE GASKET LCD	GH74-14480A
MPR-SPONGE GASKET L/C 2	GH74-14481A
MPR-SPONGE GASKET FRONT	GH74-14482A
MPR-TAPE GASKET SIDE	GH74-14483A
MPR-TAPE ANTI DUST	GH74-14484A
MPR-SPONGE LCD CONN	GH74-14490A
MPR-SPONGE SPK	GH74-14491A
MPR-BOHO VINYL F/UPPER	GH74-14585A
MPR-BOHO VINYL MAIN WIN	GH74-14586A
MPR-TAPE INSUL PBA TOP	GH74-14591A
MPR-SPONGE GASKET L/C 1	GH74-15095A
MPR-SPONGE LCD	GH74-15097A
MPR-BOHO VINYL LCD CONN	GH74-15350A
MPR-TAPE EMI FILTER	GH74-15354A
MPR-BOHO VINYL MAIN WIN	GH74-15537A
MPR-TAPE LCD BOT INSULAT	GH74-15773A
MPR-TAPE SPK PAPER	GH74-15774A
MPR-BOHO VINYL FOLDER #2	GH74-17224A
MPR-BOHO VINYL ELE M/W	GH74-18261A
MPR-BOHO VINYL DUAL R	GH74-18660A

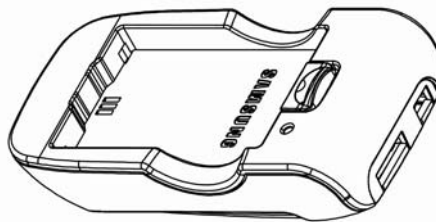
8-3. Travel Adaptor



Travel Adaptor

GH44-00908A

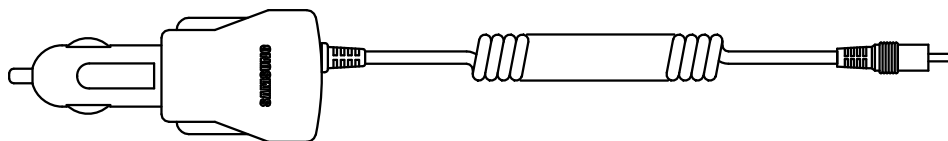
8-4. Battery Charger



Desktop Charger

GH44-00961A

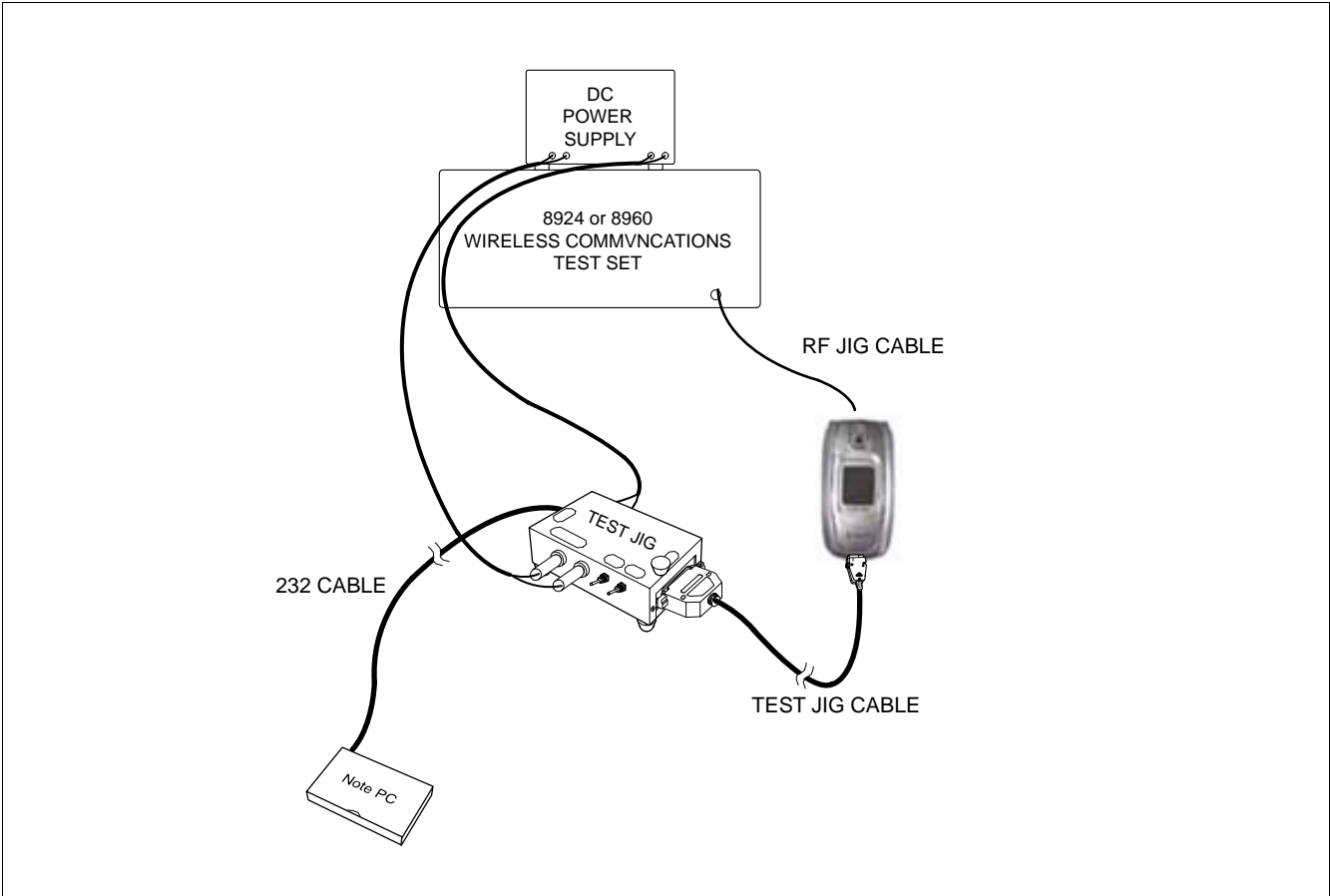
8-5. Cigarette Lighter Adaptor



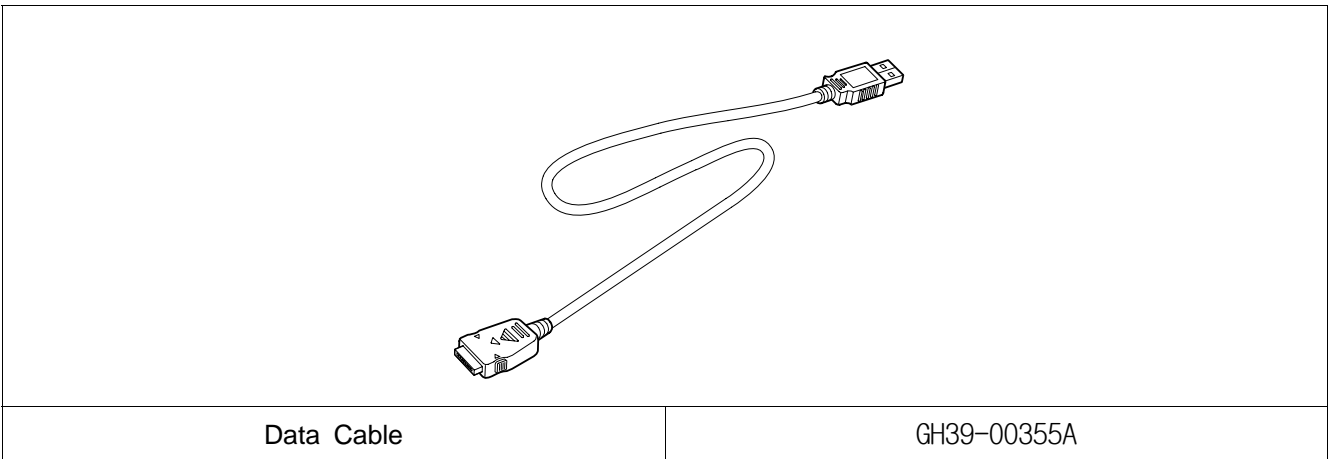
Cigarette Lighter Adaptor

GH4400318A

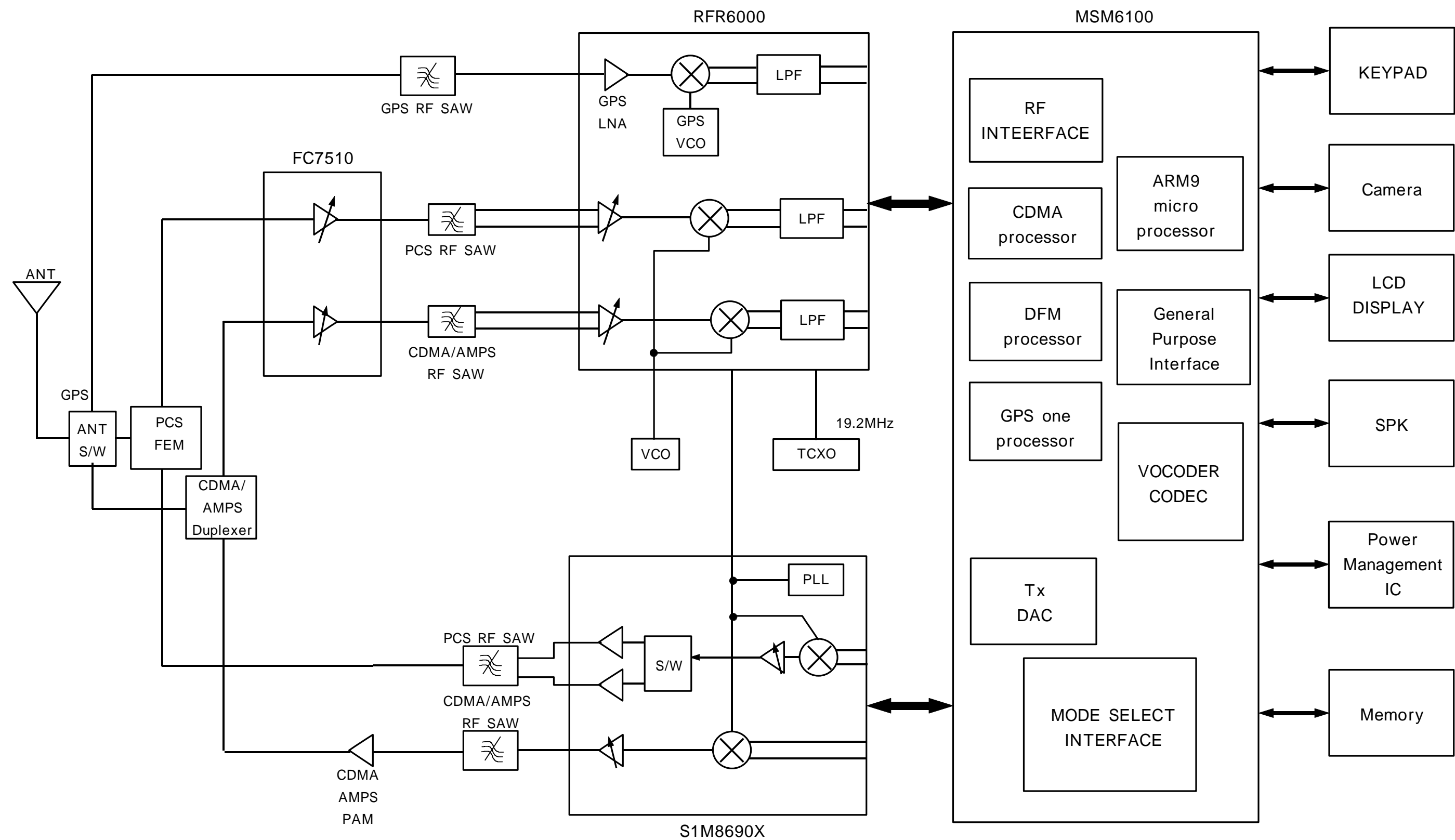
8-7. The connecntion of Test Jig



8-8. Data Cable



9. Block Diagrams



10. Electrical Parts List

Design LOC	Description	SEC CODE
CN401	NPR-CONTACT ANT	GH71-00734A
C100	C-CER,CHIP	2203-005393
C101	C-CER,CHIP	2203-000812
C102	C-CER,CHIP	2203-000812
C103	C-CER,CHIP	2203-000254
C104	C-CER,CHIP	2203-005393
C105	C-CER,CHIP	2203-000386
C106	C-CER,CHIP	2203-000386
C107	C-CER,CHIP	2203-000386
C108	C-CER,CHIP	2203-000254
C109	C-CER,CHIP	2203-005061
C112	C-CER,CHIP	2203-000386
C113	C-CER,CHIP	2203-000386
C114	C-CER,CHIP	2203-000254
C115	C-CER,CHIP	2203-005061
C118	C-CER,CHIP	2203-005061
C119	C-CER,CHIP	2203-000386
C120	C-CER,CHIP	2203-000233
C121	C-CER,CHIP	2203-000438
C122	C-CER,CHIP	2203-000254
C125	C-CER,CHIP	2203-000254
C126	C-CER,CHIP	2203-005061
C127	C-CER,CHIP	2203-000386
C128	C-CER,CHIP	2203-000254
C130	C-CER,CHIP	2203-000679
C131	C-CER,CHIP	2203-000679
C133	C-CER,CHIP	2203-005061
C134	C-CER,CHIP	2203-006093
C135	C-CER,CHIP	2203-005061
C136	C-CER,CHIP	2203-005509
C137	C-CER,CHIP	2203-006093
C138	C-CER,CHIP	2203-005061
C139	C-CER,CHIP	2203-001405
C140	C-CER,CHIP	2203-001405
C141	C-CER,CHIP	2203-001405
C142	C-CER,CHIP	2203-001405
C143	C-CER,CHIP	2203-005061

Design LOC	Description	SEC CODE
C144	C-CER,CHIP	2203-005061
C145	C-CER,CHIP	2203-006091
C146	C-CER,CHIP	2203-006091
C147	C-CER,CHIP	2203-005061
C148	C-CER,CHIP	2203-005061
C149	C-CER,CHIP	2203-005061
C150	C-CER,CHIP	2203-005061
C151	C-CER,CHIP	2203-005061
C152	C-CER,CHIP	2203-005061
C153	C-CER,CHIP	2203-000438
C154	C-CER,CHIP	2203-001072
C155	C-CER,CHIP	2203-000233
C156	C-CER,CHIP	2203-000254
C157	C-CER,CHIP	2203-000254
C158	C-CER,CHIP	2203-005482
C159	C-CER,CHIP	2203-000254
C160	C-CER,CHIP	2203-000254
C161	C-CER,CHIP	2203-005509
C162	C-CER,CHIP	2203-000812
C163	C-CER,CHIP	2203-005061
C164	C-CER,CHIP	2203-001072
C200	C-CER,CHIP	2203-005664
C201	C-CER,CHIP	2203-006201
C202	C-CER,CHIP	2203-006201
C203	C-CER,CHIP	2203-006201
C204	C-CER,CHIP	2203-005482
C205	C-TA	2404-001268
C206	C-TA	2404-001268
C207	C-CER,CHIP	2203-005061
C208	C-CER,CHIP	2203-001072
C209	C-TA	2404-001105
C210	C-CER,CHIP	2203-000254
C211	C-CER,CHIP	2203-001652
C212	C-CER,CHIP	2203-000585
C213	C-CER,CHIP	2203-006201
C214	C-CER,CHIP	2203-005061
C215	C-CER,CHIP	2203-005061

Design LOC	Description	SEC CODE
C216	C-CER,CHIP	2203-005061
C218	C-CER,CHIP	2203-005061
C219	C-CER,CHIP	2203-005664
C220	C-CER,CHIP	2203-005664
C221	C-CER,CHIP	2203-006201
C222	C-CER,CHIP	2203-006053
C223	C-CER,CHIP	2203-006053
C224	C-CER,CHIP	2203-006201
C226	C-CER,CHIP	2203-006201
C227	C-CER,CHIP	2203-006201
C228	C-CER,CHIP	2203-005061
C229	C-CER,CHIP	2203-005061
C232	C-CER,CHIP	2203-005482
C233	C-CER,CHIP	2203-006053
C237	C-TA	2404-001151
C241	C-TA	2404-001151
C251	C-CER,CHIP	2203-000679
C252	C-CER,CHIP	2203-000812
C253	C-CER,CHIP	2203-000812
C254	C-CER,CHIP	2203-000812
C255	C-CER,CHIP	2203-000812
C256	C-CER,CHIP	2203-000812
C257	C-CER,CHIP	2203-000812
C258	C-CER,CHIP	2203-000812
C260	C-CER,CHIP	2203-000233
C261	C-CER,CHIP	2203-005482
C263	C-CER,CHIP	2203-006093
C264	C-CER,CHIP	2203-006093
C266	C-CER,CHIP	2203-000812
C267	C-CER,CHIP	2203-000812
C268	C-TA	2404-001268
C269	C-CER,CHIP	2203-000679
C270	C-CER,CHIP	2203-000679
C271	C-CER,CHIP	2203-000812
C272	C-CER,CHIP	2203-001072
C273	C-CER,CHIP	2203-001072
C274	C-CER,CHIP	2203-001072

Design LOC	Description	SEC CODE
C275	C-CER,CHIP	2203-001072
C276	C-CER,CHIP	2203-001072
C277	C-CER,CHIP	2203-001072
C278	C-CER,CHIP	2203-001072
C280	C-CER,CHIP	2203-000679
C281	C-CER,CHIP	2203-000386
C282	C-CER,CHIP	2203-000386
C284	C-CER,CHIP	2203-000278
C285	C-CER,CHIP	2203-000278
C300	C-CER,CHIP	2203-006208
C301	C-CER,CHIP	2203-005061
C302	C-CER,CHIP	2203-000233
C304	C-CER,CHIP	2203-000233
C305	C-CER,CHIP	2203-000438
C306	C-CER,CHIP	2203-005054
C307	C-CER,CHIP	2203-006201
C308	C-CER,CHIP	2203-005482
C309	C-CER,CHIP	2203-000995
C310	C-CER,CHIP	2203-005054
C311	C-CER,CHIP	2203-000438
C313	C-CER,CHIP	2203-005382
C314	C-CER,CHIP	2203-000438
C315	C-CER,CHIP	2203-005482
C316	C-CER,CHIP	2203-000233
C317	C-CER,CHIP	2203-000233
C318	C-CER,CHIP	2203-005382
C319	C-CER,CHIP	2203-000438
C322	C-CER,CHIP	2203-005061
C323	C-CER,CHIP	2203-005482
C324	C-CER,CHIP	2203-000233
C325	C-CER,CHIP	2203-000233
C326	C-CER,CHIP	2203-000995
C327	C-CER,CHIP	2203-005061
C328	C-CER,CHIP	2203-000995
C329	C-TA	2404-001268
C330	C-CER,CHIP	2203-005061
C331	C-CER,CHIP	2203-005061

Design LOC	Description	SEC CODE
C332	C-CER,CHIP	2203-000995
C333	C-CER,CHIP	2203-000995
C334	C-CER,CHIP	2203-005482
C335	C-CER,CHIP	2203-005061
C336	C-CER,CHIP	2203-000233
C337	C-CER,CHIP	2203-000254
C338	C-CER,CHIP	2203-000438
C342	C-CER,CHIP	2203-005481
C353	C-CER,CHIP	2203-006093
C400	C-CER,CHIP	2203-000233
C402	C-CER,CHIP	2203-000885
C403	C-CER,CHIP	2203-005288
C404	C-CER,CHIP	2203-000585
C405	C-CER,CHIP	2203-000585
C406	C-CER,CHIP	2203-000278
C407	C-CER,CHIP	2203-000995
C408	C-CER,CHIP	2203-005061
C409	C-CER,CHIP	2203-006208
C410	C-CER,CHIP	2203-000254
C411	C-CER,CHIP	2203-005393
C412	C-CER,CHIP	2203-000940
C413	C-CER,CHIP	2203-006201
C414	C-CER,CHIP	2203-000885
C415	C-CER,CHIP	2203-000940
C416	C-CER,CHIP	2203-000885
C417	C-CER,CHIP	2203-006201
C418	C-CER,CHIP	2203-005061
C419	C-CER,CHIP	2203-000233
C420	C-CER,CHIP	2203-000885
C421	C-CER,CHIP	2203-000233
C422	C-CER,CHIP	2203-000254
C423	C-CER,CHIP	2203-005393
C424	C-CER,CHIP	2203-005288
C425	INDUCTOR-SMD	2703-001786
C426	C-CER,CHIP	2203-000438
C428	C-CER,CHIP	2203-001178
C429	C-CER,CHIP	2203-000438

Design LOC	Description	SEC CODE
C432	C-CER,CHIP	2203-001259
C433	C-CER,CHIP	2203-000254
C434	C-CER,CHIP	2203-005393
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C443	C-CER,CHIP	2203-006208
C444	C-CER,CHIP	2203-000885
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C452	C-CER,CHIP	2203-000438
C480	C-CER,CHIP	2203-006307
C481	C-CER,CHIP	2203-005482
C482	C-CER,CHIP	2203-005482
C485	C-CER,CHIP	2203-001072
C486	C-CER,CHIP	2203-001072
C487	C-CER,CHIP	2203-006093
C488	C-CER,CHIP	2203-006093
C489	C-CER,CHIP	2203-000386
C490	C-TA	2404-001394
C491	C-TA	2404-001394
CN200	Ear_Jack	3722-002067
CN201	Connector-Header	3711-005397
CN202	Connector-Socket	3710-001611
CN203	Connector-Header	3711-005781
CN204	DC_Jack	3722-002344
CN400	Connector_Coaxial	3705-001365

Design LOC	Description	SEC CODE
D100	LED	0601-001785
D101	LED	0601-001785
D102	LED	0601-001785
D103	LED	0601-001785
D104	LED	0601-001785
D105	LED	0601-001785
D106	LED	0601-001785
D107	LED	0601-001785
D108	LED	0601-001785
D109	LED	0601-001785
D110	LED	0601-001785
D111	LED	0601-001785
D112	LED	0601-001785
D113	LED	0601-001785
D200	Zener_Diode	0403-001387
D201	DIODE_SWITCHING	0401-001110
D202	DIODE_SWITCHING	0401-001110
D203	TVS_Diode	0406-001104
D205	TVS_Diode	0406-001150
D206	TVS_Diode	0406-001201
D207	TVS_Diode	0406-001201
D208	LED	0601-001785
D209	LED	0601-001785
F200	EMI FILTER	2901-001311
F201	EMI FILTER	2901-001311
F202	EMI FILTER	2901-001311
F203	EMI FILTER	2901-001311
F204	EMI FILTER	2901-001311
F205	VARISTOR	1405-001119
F206	EMI FILTER	2901-001311
F300	FILTER_SAW	2904-001521
F301	FILTER_SAW	2904-001519
F302	FILTER_SAW	2904-001414
F400	FILTER_SAW	2904-001499
F401	AFEM7731	2911-000011
F402	FILTER_DUPLEXER	2910-000007
F403	FILTER_SAW	2904-001338

Design LOC	Description	SEC CODE
L102	BEAD	3301-001342
L200	INDUCTOR-SMD	2703-002775
L201	BEAD	3301-001342
L203	BEAD	3301-001120
L204	BEAD	3301-001120
L206	R-CHIP	2007-000171
L300	INDUCTOR-SMD	2703-002314
L301	INDUCTOR-SMD	2703-001786
L302	INDUCTOR-SMD	2703-002204
L303	INDUCTOR-SMD	2703-001733
L304	INDUCTOR-SMD	2703-001748
L307	INDUCTOR-SMD	2703-001737
L308	INDUCTOR-SMD	2703-001868
L309	INDUCTOR-SMD	2703-001737
L310	INDUCTOR-SMD	2703-001722
L311	INDUCTOR-SMD	2703-001737
L312	INDUCTOR-SMD	2703-002369
L313	INDUCTOR-SMD	2703-002281
L314	INDUCTOR-SMD	2703-001868
L400	INDUCTOR-SMD	2703-001737
L401	BEAD	3301-001342
L402	INDUCTOR-SMD	2703-002200
L405	INDUCTOR-SMD	2703-002782
L406	BEAD	3301-001342
L408	R-CHIP	2007-000171
OSC101	CRYSTAL_SLEEP	2801-004353
OSC300	OSCILLATOR-VCO	2806-001348
OSC301	OSCILLATOR-VCTCXO	2809-001277
OSC302	RESONATOR-CERAMIC	2802-001210
Q100	Mr_Sensor	1209-001615
Q202	MOSFET	0505-001889
R100	R-CHIP	2007-000157
R101	R-CHIP	2007-001313
R102	R-CHIP	2007-000162
R103	R-CHIP	2007-001305
R104	R-CHIP	2007-001305
R105	R-CHIP	2007-001305

Design LOC	Description	SEC CODE
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R107	R-CHIP	2007-001305
R108	R-CHIP	2007-001305
R109	R-CHIP	2007-001305
R110	R-CHIP	2007-001305
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R115	R-CHIP	2007-001305
R116	R-CHIP	2007-001305
R117	R-CHIP	2007-007306
R118	R-CHIP	2007-000141
R119	R-CHIP	2007-000141
R120	R-CHIP	2007-000153
R121	R-CHIP	2007-001339
R122	R-CHIP	2007-000148
R123	R-CHIP	2007-000143
R124	R-CHIP	2007-000169
R125	R-CHIP	2007-000172
R126	R-CHIP	2007-000148
R127	R-CHIP	2007-001339
R128	R-CHIP	2007-000140
R129	R-CHIP	2007-000156
R130	R-CHIP	2007-000141
R132	R-CHIP	2007-007529
R133	R-CHIP	2007-007107
R134	R-CHIP	2007-007313
R135	R-CHIP	2007-000775
R136	R-CHIP	2007-000162
R137	R-CHIP	2007-000143
R138	R-CHIP	2007-000140
R139	R-CHIP	2007-001308
R140	R-CHIP	2007-000171
R143	R-CHIP	2007-000148
R144	R-CHIP	2007-000138
R145	R-CHIP	2007-000138

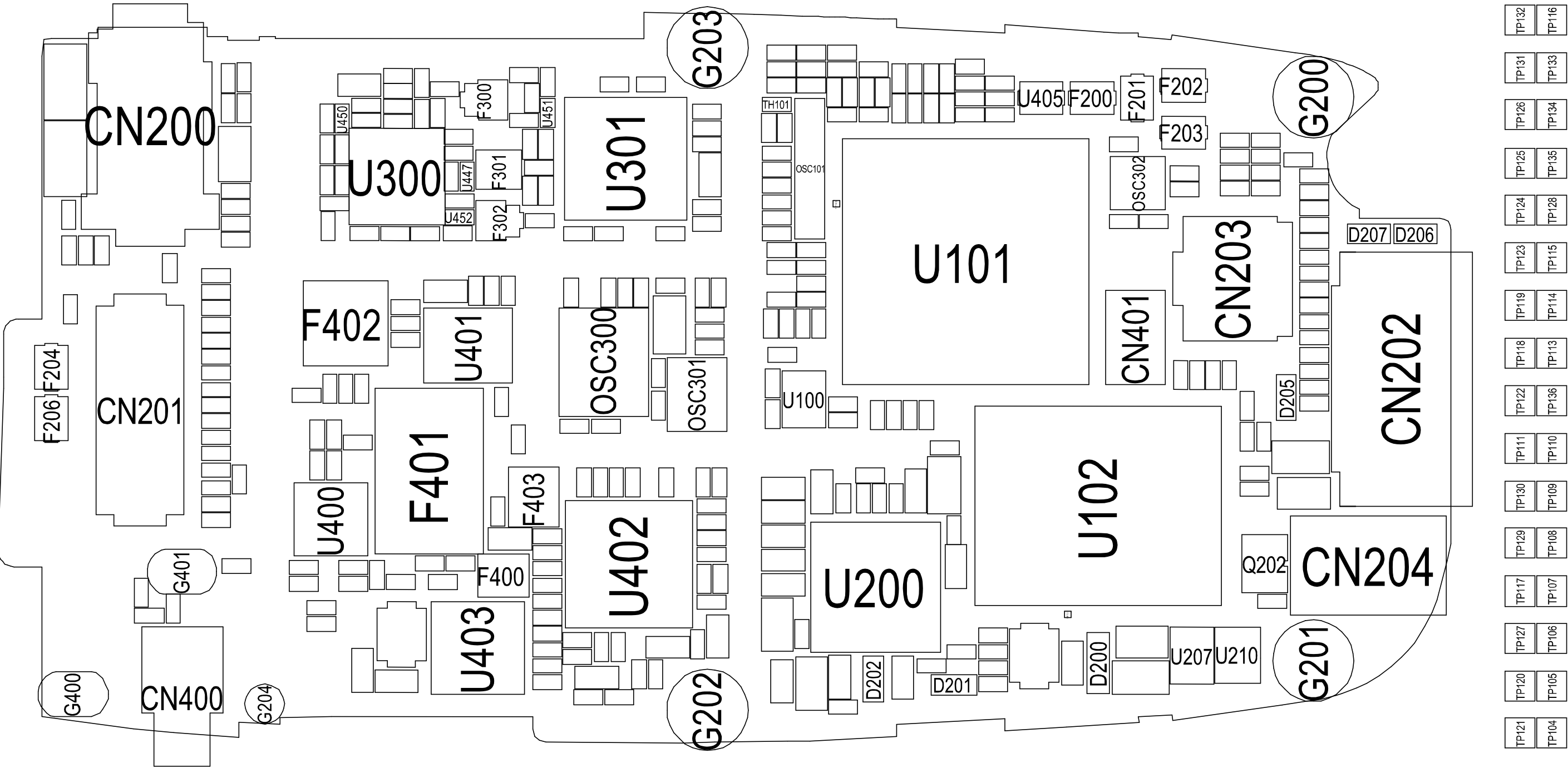
Design LOC	Description	SEC CODE
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R203	R-CHIP	2007-007148
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R205	R-CHIP	2007-000162
R206	R-CHIP	2007-000140
R207	R-CHIP	2007-000172
R208	R-CHIP	2007-000171
R210	R-CHIP	2007-007107
R211	R-CHIP	2007-000148
R212	R-CHIP	2007-007139
R213	R-CHIP	2007-000758
R214	R-CHIP	2007-000171
R220	R-CHIP	2007-000172
R228	R-CHIP	2007-000171
R230	R-CHIP	2007-001298
R235	R-CHIP	2007-001298
R238	R-CHIP	2007-000143
R239	R-CHIP	2007-000143
R240	R-CHIP	2007-000143
R243	R-CHIP	2007-000140
R244	R-CHIP	2007-000140
R249	R-CHIP	2007-007309
R250	R-CHIP	2007-007137
R251	R-CHIP	2007-007107
R252	R-CHIP	2007-000172
R253	R-CHIP	2007-000138
R254	R-CHIP	2007-000138
R255	R-CHIP	2007-000138
R256	R-CHIP	2007-000138
R257	R-CHIP	2007-000138
R300	R-CHIP	2007-001290
R301	R-CHIP	2007-001290
R302	R-CHIP	2007-007314
R303	R-CHIP	2007-007491
R304	R-CHIP	2007-007138
R305	R-CHIP	2007-007314

Design LOC	Description	SEC CODE
R306	R-CHIP	2007-000138
R307	R-CHIP	2007-000138
R308	R-CHIP	2007-000171
R309	R-CHIP	2007-000172
R310	R-CHIP	2007-000140
R311	R-CHIP	2007-001298
R312	R-CHIP	2007-000138
R335	R-CHIP	2007-007627
R336	R-CHIP	2007-007627
R400	R-CHIP	2007-001308
R401	R-CHIP	2007-007309
R402	R-CHIP	2007-000172
R403	R-CHIP	2007-000140
R405	R-CHIP	2007-000171
R406	R-CHIP	2007-000148
R407	R-CHIP	2007-000140
R408	R-CHIP	2007-007528
R409	R-CHIP	2007-000172
R410	R-CHIP	2007-001308
R411	R-CHIP	2007-002797
R412	R-CHIP	2007-000148
R413	R-CHIP	2007-000140
R414	R-CHIP	2007-000148
R415	R-CHIP	2007-000171
R416	R-CHIP	2007-001284
R417	R-CHIP	2007-001284
R418	R-CHIP	2007-000171
R419	R-CHIP	2007-000171
R420	R-CHIP	2007-001305
R421	R-CHIP	2007-001305
SW101	Tact Switch	3404-001143
TH101	THERMISTOR-NTC	1404-001165
U100	INVERTER	0801-002345
U101	MSM6100	1205-002313
U102	MEMORY	1109-001293
U200	PMIC	1203-003495
U201	Analog Switch	1001-001215

Design LOC	Description	SEC CODE
U202	Analog Switch	1001-001215
U204	Analog Switch	1001-001215
U206	Analog Switch	1001-001215
U207	DIODE_ARRAY	0407-001038
U209	BUFFER	0801-002661
U210	MAX4838EXT	1203-003408
U300	LNA	1205-002721
U301	RFR	1205-002265
U302	Audio amp	1201-002240
U400	RF_Switch	1001-001303
U401	ACPM-7813	1201-002056
U402	RFT	1205-002497
U403	MAX8506	1203-003366
U404	VARISTOR	1405-001138
U405	EMI FILTER	2901-001311
U435	C-CER,CHIP	2203-000254
U439	C-CER,CHIP	2203-000233
U447	C-CER,CHIP	2203-000438
U450	INDUCTOR-SMD	2703-001751
U451	INDUCTOR-SMD	2703-001733
U453	BEAD	3301-001120
U454	BEAD	3301-001120
U456	C-CER,CHIP	2203-006093
U458	C-CER,CHIP	2203-005482
U459	C-CER,CHIP	2203-005481
U460	C-CER,CHIP	2203-005481
U461	C-CER,CHIP	2203-005481
U465	R-CHIP	2007-007698
U466	R-CHIP	2007-007698
U467	Audio amp	1201-002240
U468	C-CER,CHIP	2203-005482
V200	VARISTOR	1405-001138
V201	VARISTOR	1405-001138
V202	VARISTOR	1405-001110
V203	VARISTOR	1405-001138
V204	VARISTOR	1405-001110
V205	VARISTOR	1405-001138

Design LOC	Description	SEC CODE
V206	VARISTOR	1405-001110
V207	VARISTOR	1405-001110
V208	VARISTOR	1405-001110
V209	VARISTOR	1405-001110
V210	VARISTOR	1405-001138
V211	VARISTOR	1405-001138
V212	VARISTOR	1405-001110
V213	VARISTOR	1405-001138
V214	VARISTOR	cc

11-1. Main PCB Top Diagram



11-2. Main PCB Bottom Diagram

